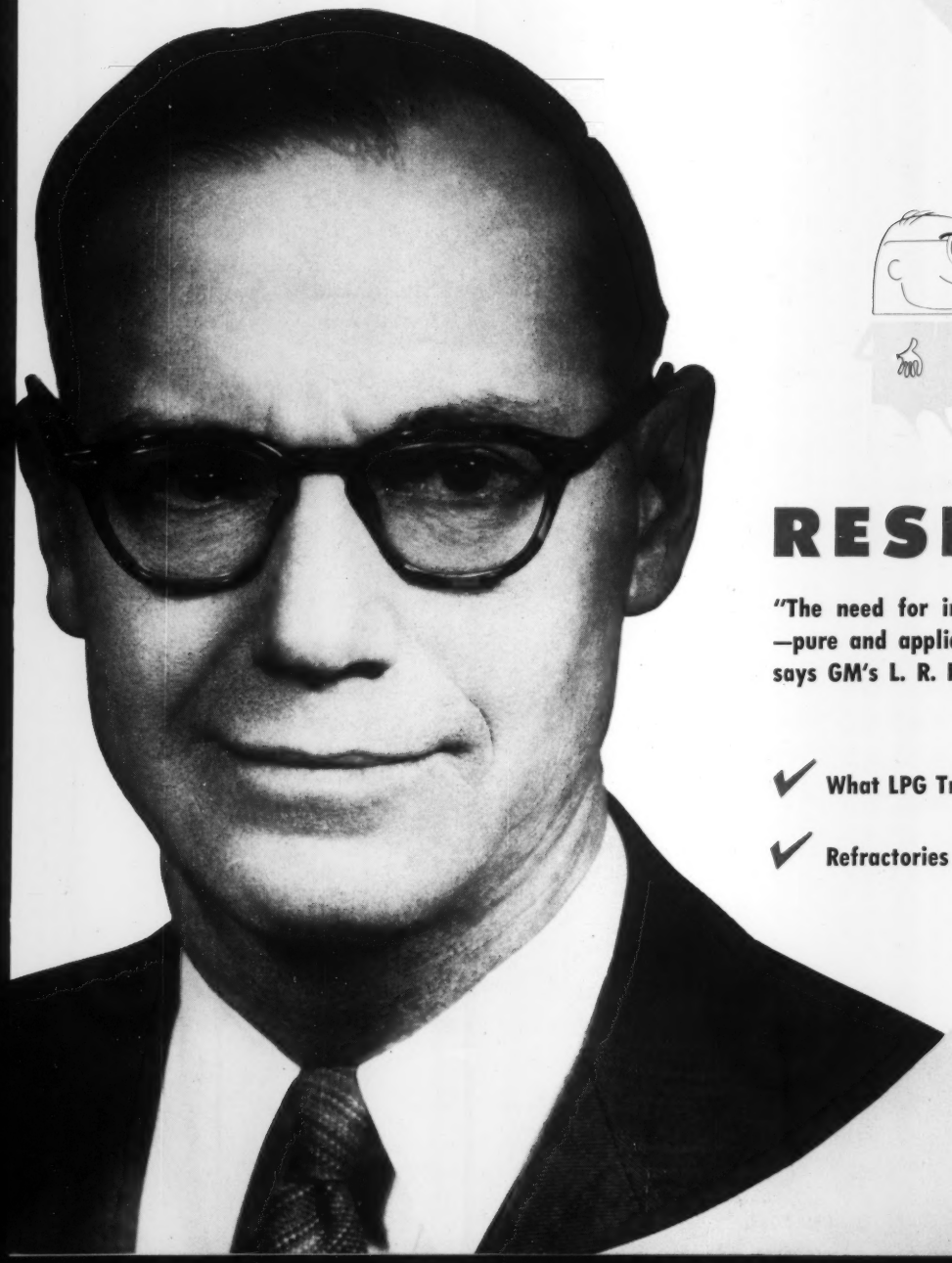
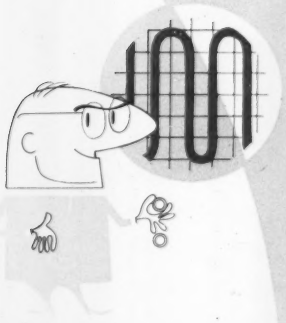
A PROGRAM FOR MANAGEMENT
1957 . . . No. 6

JULY 15, 1957

STEEL
The Metalworking Weekly

A PENTON PUBLICATION





RESEARCH:

"The need for intelligent industrial research —pure and applied—has never been greater," says GM's L. R. Hafsted . . . page 93

✔ **What LPG Trucks Offer You . . . page 104**

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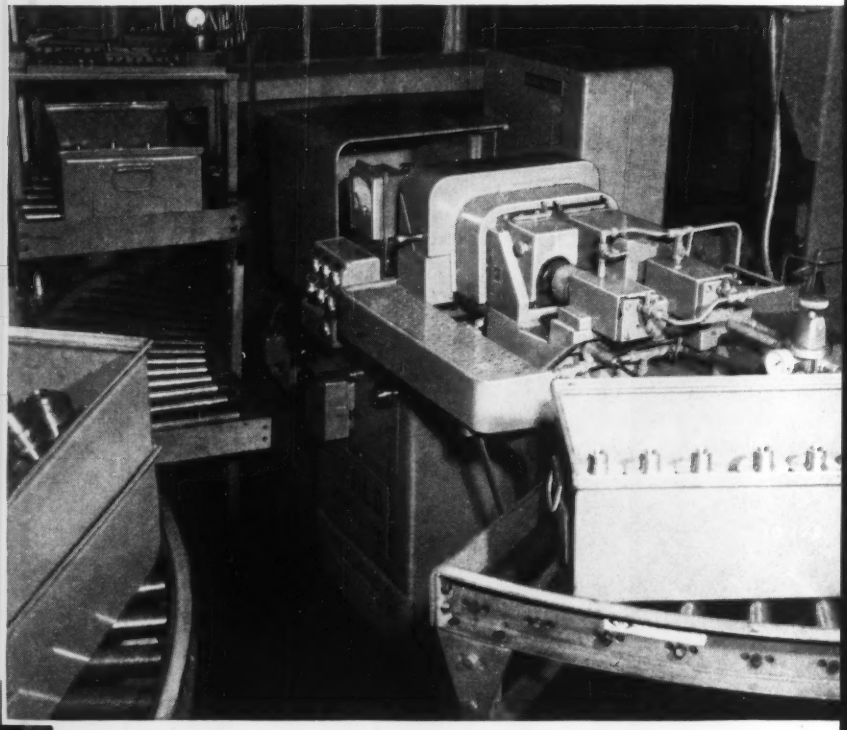
GUN DRILLING on a Bore-Matic gives

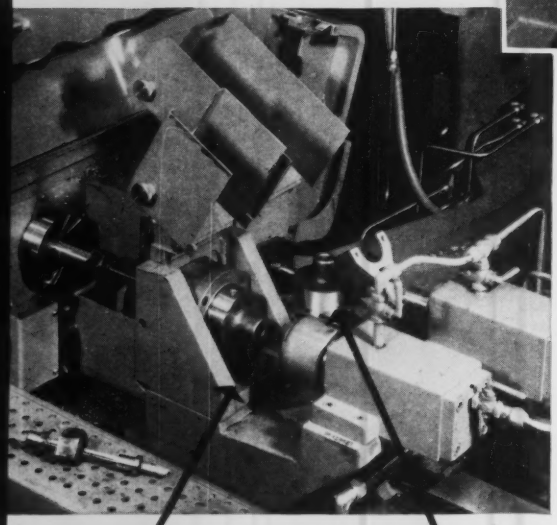
SURE-FIRE PRODUCTION

with

- higher precision
- better finish
- easier operation
- less maintenance
- lower costs



Model 121 Bore-Matic equipped for gun drilling is positioned in a conveyorized production line. Left foreground conveyor brings work to operator and lower background conveyor takes it to intermediate operations. Right foreground conveyor returns work for second gun drilling and upper background conveyor takes pieces away.



FRONT STATION—Gun drill plunger hole from solid. Coolant is confined inside part, after drill breaks through, by Neoprene tip on hydraulic clamping head.

REAR STATION—Gun drill port hole from solid. Holes are plugged to confine pressure (750 psi) coolant inside work after drill breaks through.

THE PRECISION and speed of a Bore-Matic make it a natural for gun drilling. For example, the two-station Model 121 shown here was fitted with adapters to hold the gun drills on the boringhead spindles and with hydraulic clamping heads mounted on the table for the mating bushings. It replaced a two-spindle gun drilling machine for handling the plunger and port holes in Nitralloy hydraulic heads. Here are the results:

PRODUCTION was increased from 24 to 27 parts per hour for plunger hole. Port hole production — previously done on drill press with final location by subsequent grinding of shoulder — went up to 48 parts per hour with *accurate* location.

TOLERANCES were reduced from .002 to .001. Both holes straight within 20 to 30 millionths.

FINISH was improved from 60 rms to 15 rms; and honing was eliminated.

OPERATIONAL handling time was cut in half.

MAINTENANCE was substantially reduced.

COSTS were cut by 75% over previous method.

Another plus factor was that the closer tolerances resulted in great savings in subsequent operations.

For more information on this and other interesting and profitable set-up possibilities with a Bore-Matic, get in touch with your nearest Heald representative.

IT PAYS TO COME TO HEALD!

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This Steel is Great for Machinability

YEARS OF TESTING HAVE CONVINCED US THAT BETHLEHEM C-12XX STEELS ARE HARD TO BEAT FOR SCREW STOCK

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Our next job, as we saw it, was to keep the closest possible check on these steels. To do this we put a six-spindle bar automatic to work with a steady diet of C-1211, C-1212 and C-1213 bars, cold-finished. We selected typical operations, including forming, drilling, turning, facing, tapping and cut-off. In every respect but one this has been a normal production operation. That one critical difference has been that *every aspect of this project has been planned and supervised by our Research Department.*

You get outstanding surface quality with Bethlehem free-machining steels.

Tests prove that with proper tooling Bethlehem C-12xx steels give you excellent chip control.

In this time we've tested representative lots of C-12xx steels totalling about 2,000 tons, produced on our Lackawanna and Johnstown bar mills. We've taken hundreds of samples for thorough laboratory examination. We've kept voluminous records.

The results have been threefold. First, we have been assured that these steels are excellent for the recommended use. Second, we've maintained a constant check on product quality. Third, our findings have led to refinements that have made these steels better than ever.

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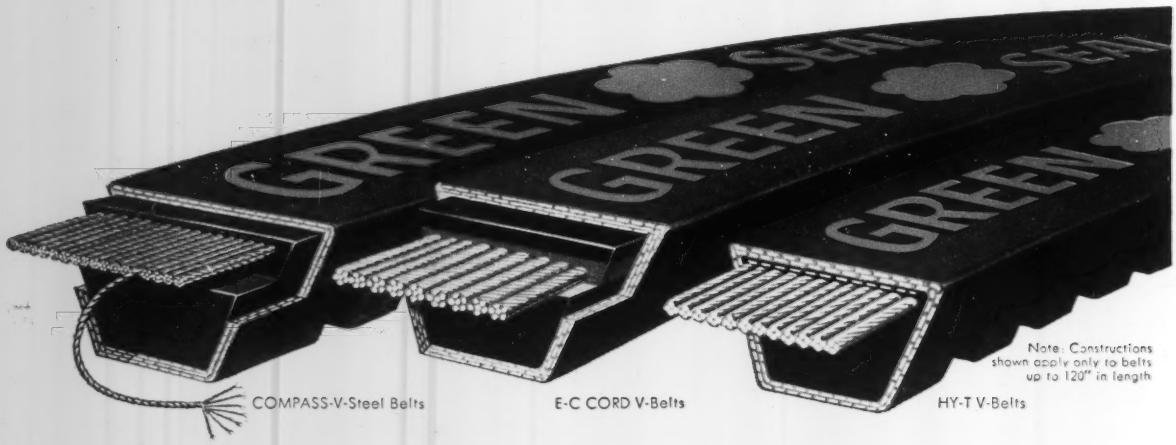
BETHLEHEM STEEL

BETHLEHEM STEEL

Now—V-Belts with the Green Seal solve the major multiple drive problem



COMPASS-V-Steel Belts E-C CORD V-Belts HY-T V-Belts

Note: Constructions shown apply only to belts up to 120" in length

The Green Seal stands for true dimensional stability in V-belts. And with Green Seal dimensionally stable belts you can be sure that matched sets are truly matched and will stay matched—that mismatching (the biggest problem in belting multiple drives successfully) is a thing of the past.

The key to dimensional stability lies in the tension members of the belt. For many years, steel cables as developed by Goodyear were the only length stable load carriers, but now they have been joined by synthetic cords, thanks to the amazing Triple-Tempered 3-T process.

The 3-T process is an exclusive method of tempering the cord with Tension, Temperature and Time for maximum strength and minimum change in dimensions. This assures no change in length during storage plus greatly increased shock- and stretch-resistance on the drive.

The end result is smoother, longer-running teams of belts that give you maximum, trouble-free, horsepower hours at minimum cost. What better reason for specifying V-belts with the Green Seal?

DIMENSIONALLY STABLE V-BELTS with the GREEN SEAL by

GOODYEAR

THE GREATEST NAME IN RUBBER

The Goodyear Tire & Rubber Company, Industrial Products Division, Dept. 794, Akron 16, Ohio

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Company_____

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City_____ Zone_____ State_____

Compass, E-C Cord, Hy-T, Green Seal—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

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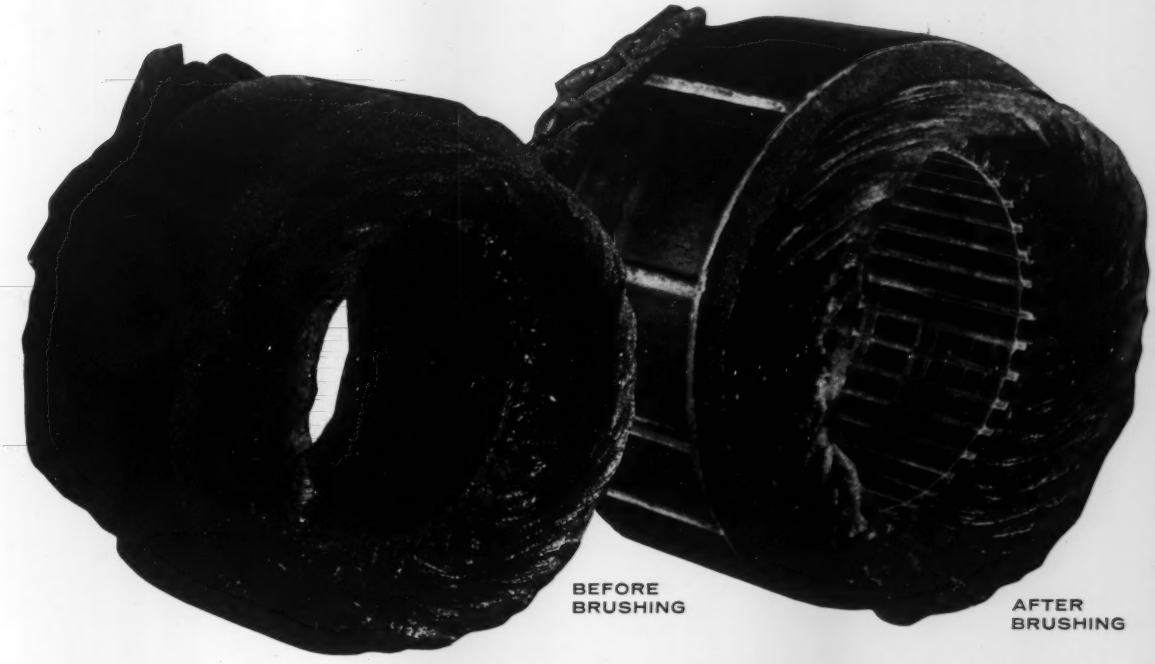
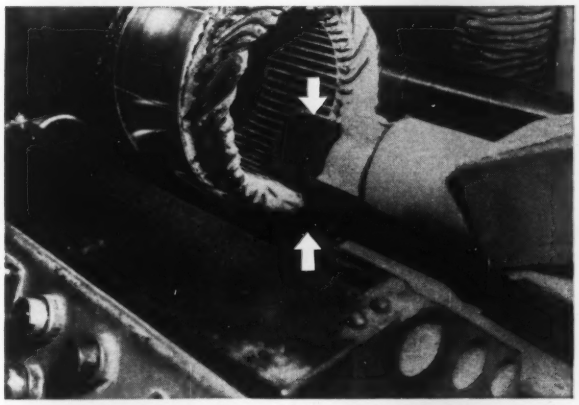


Fast cleanup...

inside and out with Osborn Power Brushing



Dual cleaning job *at a fraction of the cost using Osborn Power Brushes.*

THE problem—to clean varnish from both the inside and outside surfaces of electric motor stators. Formerly, two cleaning operations were necessary. Results were inconsistent . . . the operations costly and time consuming.

With Osborn Power Brushes, the entire cleaning job is now done at the push of a button—and for a fraction of the previous cost. The operator merely places the stator on guide rolls. Brushes are automatically moved across the external and internal surfaces of the lamination stack. The varnish is quickly and thoroughly removed.

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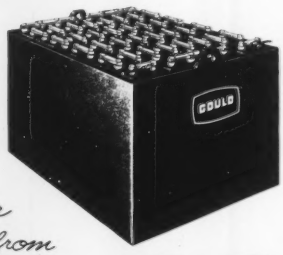

More Power to you from

gould
BATTERIES

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The Metalworking Weekly

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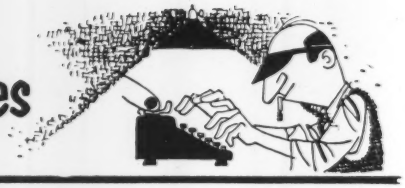
behind the scenes



Research Pays Off

The Program for Management story on page 93 this week gives one, as is frequently remarked in French, furiously to think. Machine Tool Editor Robert Huber, who researched and developed the research and development story, assured us that since 1950 more money has been spent by industry and government (here we go again) on research and development than had been spent on these items since the beginning of U.S. history up to 1950. That should jolt you in your old rockin' chair.

Bob told us that his investigations revealed that industry must research now for future products, on account of ten years from now today's products will be definitely—to borrow a term from market writers—sluggish. Worse than that, the manufacturer who goes along with one product without improving or modifying it is flirting with dreadful statistics.

After you read the article, Mr. Huber would appreciate your comments.

Comedy of Errors

Associate Managing Editor John Morgan is a man upon whom the gods frequently smile crookedly. Although he attends church, supports his family, pays taxes and is kind to animals, children and old ladies, things happen to him.

If the court pleases, we will call your attention to the recent National Metal Trades Association plant management conference at Lake Delton, Wis. Lake Delton is 100 miles W.N.W. of Milwaukee and when John bought an airplane ticket, the agent was obliged to consult a geography that weighed at least 8 lb.

At Chicago the honest fellow changed planes, but his luggage, possibly by its western momentum, continued on to San Francisco. We next find him stepping out of a bus in central Wisconsin, still 4 miles short of his goal. The local taxi was not running, he was informed, and when he called the hotel, the manager told him that their pickup car had been stolen that day. So John walked the 4 miles, reflecting optimistically that he had no luggage to carry. Business at Lake Delton was combined with pleasure, and Morgan began to wonder how long his shirt would hold out, how long his whiskers would grow and whether his teeth would turn green without attention. He rushed to a nearby town for clothing and supplies, and found he had to pay almost double because he was in a resort area. Before he renewed his socks, he went barefoot.

Some friends at the meeting advised him about a short cut home. He took a bus to somewhere, waited four or five hours, transferred to a train that was already half an hour late and arrived in Chicago in a daze. He hired a cab to whip him out to the airport, paid the man double, and whirled into the field just in time to see his plane lurching into the air. During the long wait, he did some intensive detective work, and 40 minutes before he was air-borne, he was reunited with his luggage, which had come back like a boomerang from San Francisco.

Two of his associates, Chicago Editor Bill Dean and Detroit Editor Don Postma, are deeply concerned about him. Learning that he was about to spend the holiday weekend on a yacht in western Lake Erie, they assembled a survival kit for him. It contained sun tan lotion, water wings, fishhooks, a hand compass, a flashlight, dog biscuits, a map showing the shortest route from anywhere to STEEL's editorial offices and an old Yale Yearbook.

Several weeks ago the vessel suffered some damage to its rudder, but John wasn't even aboard. When he goes aboard as a Jonah—pardon, we mean as a guest, the least we can expect is that the boat will somehow manage to knock down the Detroit-Windsor bridge.

Dig More Digits

What number is the sum of 35 times its first digit, 44 times its second and 23 times its third? If you can do this one in your head, you have a great future with the Univac people.

Shrdlu

(Metalworking Outlook—Page 47)

B.F.Goodrich report:

Men used to be in danger—giving steel an acid bath

A typical example of B.F.Goodrich improvement in rubber

THE job of cleaning rust off of long strips of steel used to be slow, costly and plenty dangerous because nothing could hold the hot acid. All kinds of tanks were tried—wood, concrete, steel. Yet acid leaked onto the floor constantly—a waste, a hazard to workmen.

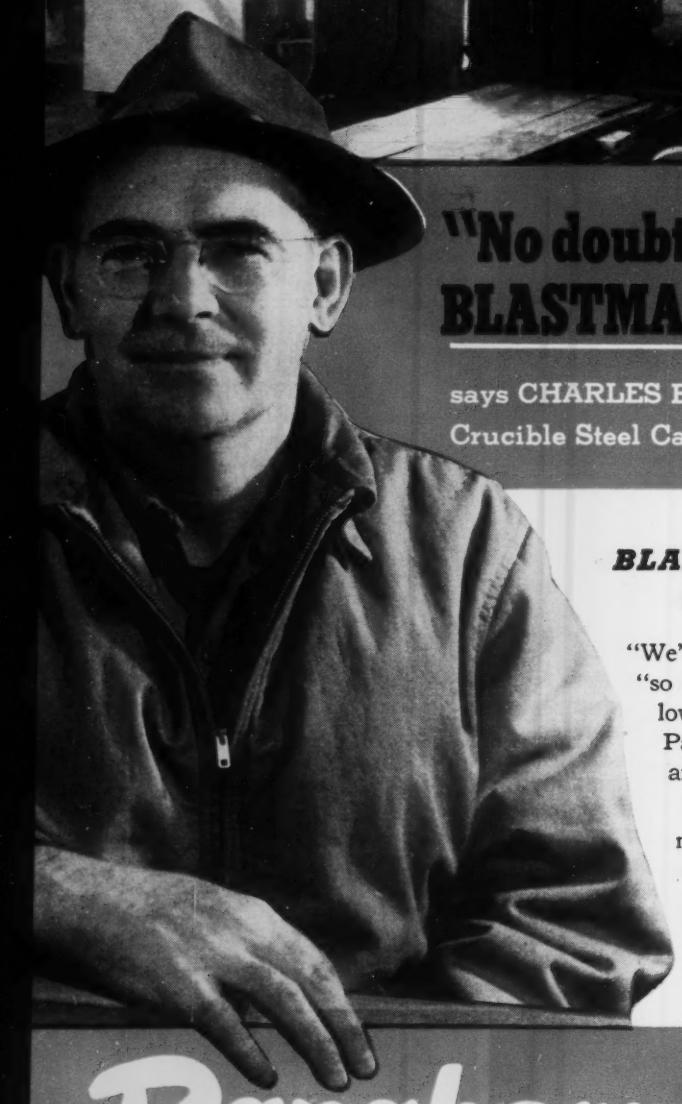
A satisfactory tank seemed impossible until B.F.Goodrich engineers came up with something entirely new in the way of a protective rubber lining. They worked out a combination lining of hard rubber sandwiched between soft rubber, called Triflex, that stands the hot acid. Then they added a brick sheathing to protect the rubber from the slicing, banging of fast-moving steel.

Acid leaks stopped wherever this B.F.Goodrich lining was used. The waste and hazard of messy, acid-wet floors became a thing of the past. At the Kaiser Steel plant pictured here, the B.F.Goodrich rubber-lined tank has been in constant use four years without maintenance expense of any kind. In many plants, linings have been in service 15 or 20 years.

B.F.Goodrich salesmen and distributors have exact specifications for the B.F.Goodrich rubber lining used in this steel mill, as well as information about products featured in hundreds of other B.F.Goodrich success stories. And, as factory-trained specialists in rubber products, these men *can* answer your questions about *all* rubber products. *B.F.Goodrich Industrial Products Co., Dept. M-999, Akron 18, Ohio.*

B.F.Goodrich

INDUSTRIAL PRODUCTS



"No doubt about it! That PANGBORN BLASTMASTER was a smart buy!"

says CHARLES BACHMAN, Plant Engineer,
Crucible Steel Casting Co., Lansdowne, Pa.

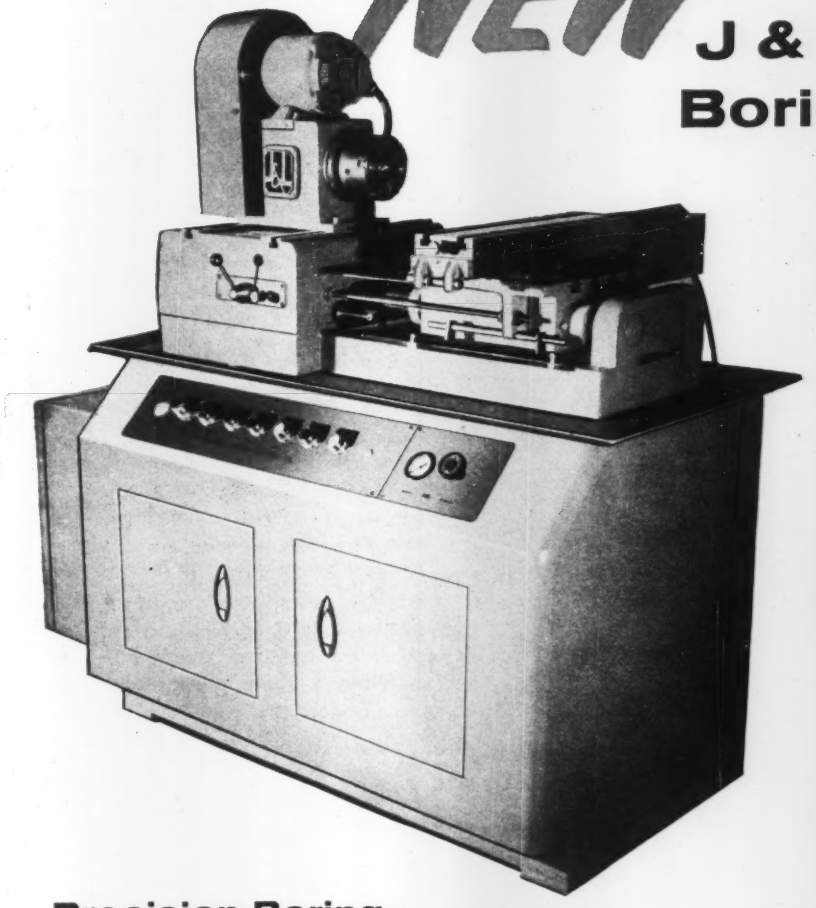
BLASTMASTER® has eliminated need for a second shift in this cleaning department.

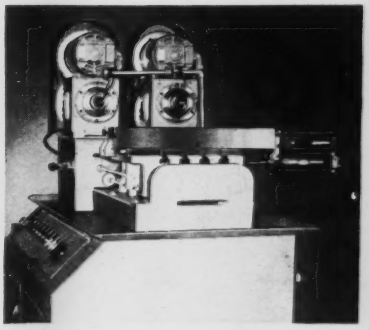
"We're interested in production figures," says Mr. Bachman, "so our blast cleaning equipment has to do good work at low cost. After studying the situation, we picked a Pangborn Blastmaster. It does the kind of job we like and its features are everything they're expected to be!"

If *you* need blast cleaning equipment, look at all makes. Then check the Pangborn Blastmaster. It offers many exclusive features plus a choice of sizes to fit your needs—1½, 3, 6, 12, 18 and 27 cu. ft. Write for Bulletin 703 to PANGBORN CORPORATION, 1600 Pangborn Boulevard, Hagerstown, Maryland. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

Pangborn blast cleans cheaper

NEW J & L Precision Boring Machine





Base will accommodate *two spindles* for rough and finish boring, simultaneous facing and boring, or for boring two holes at once.

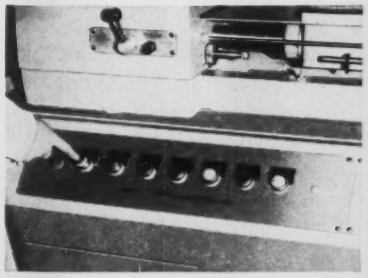
Work table feed is actuated with variable hydraulic check unit. Adjustable stops are easily set for length of rapid traverse and feed strokes.

Precision Boring– Turning – Facing at LOW COST

Jones & Lamson fills a long-felt need with this new J & L Precision Boring Machine. Now, it is possible to have truly precise turning, boring and facing operations at truly low cost.

This new machine is ideal for long *or* short runs . . . is extremely versatile . . . is easy to set up . . . and spindle runout is less than .000020″. Max. swing is 10″ dia. and max. bore is 3″ dia.

Write today for complete information.



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LETTERS
TO THE EDITORS

Opportunity for Vision

We have been reading with interest your 1957 Program for Management series.

We are reminded of a familiar quotation that goes: "Where there is no vision, the people perish!" There is no economic system that we know of that offers more opportunity for vision than that we live under.

The current series certainly indicates that American industry is fully aware of this principle. Congratulations on your fine work.

I would appreciate copies of the management articles published so far.

Dick E. Smith
Chief Manufacturing Engineer
Union Malleable Mfg. Co.
Ashland, O.

Reprints for Customers

Please send us a reprint of the article, "Contouring with Chemicals" (June 3, page 85). Can we reprint this article? We represent a chemical milling company and would like our customers to have copies.

H. R. Zahner
Moriarty & Zahner
Los Angeles

• *Permission granted.*

This article is of great interest to this company. We would appreciate a copy.

R. E. Darnell
Project Engineer
John J. Foster Mfg. Co.
Santa Ana, Calif.

Filing System Is Problem

An advisory committee here has been studying the problem of filing, and we were interested in your article, "Paper Work Chokes Profits" (June 3, page 62). Could you give us the address of the National Records Management Council?

This type article is helpful to business and should certainly keep us alert concerning the difficulties of keeping our systems as modern as our machinery.

J. A. Walters
Technical Data Section
Barber-Greene Co.
Aurora, Ill.

• *The address is 555 Fifth Ave., New York 17, N. Y.*

Market Research Department

We are establishing a new market research department and will be grateful if you will send us reprints of the following Program for Management ar-

(Please turn to page 12)

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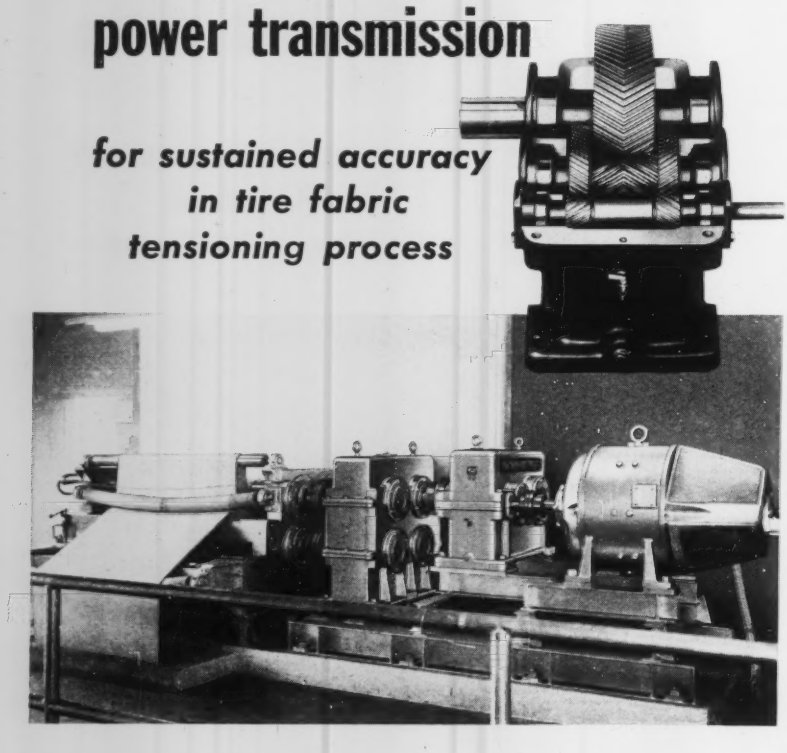
DANLY

Waldron selects H & S power transmission

for sustained accuracy in tire fabric tensioning process



Today's rugged, heavy-duty tires call for extra measures in manufacturing to insure dependability and longer life. An important process at Goodyear Tire and Rubber Company is this Nylon Tire Cord Unit designed and built by the John Waldron Corporation, New Brunswick, N. J. Its function is to apply tension to the basic Nylon cord fabric before it is calendered with rubber—a process that limits "growth" to an acceptable minimum when tires are in use.

Essentially a stretching process that takes place while the fabric moves at a fair rate of speed, exacting power requirements must be maintained. A double reduction herringbone H & S speed reducer was recommended by H & S engineers, to be energized by a 150 H.P. motor. Power is then distributed to the tensioning machine rolls by a special H & S four shaft roll drive.

Here's an important job for which H & S equipment is well suited. The use of anti-friction bearings throughout, generous size of shafts, gears and housings, and accurate machining to close tolerances assure long life and completely satisfactory performance. Consult your H & S representative or write us, for help in selecting Speed Reducers, Roll Drives or precision gears of many types—for dependable power transmission.

THE HORSBURGH & SCOTT CO.

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Cleveland 14, Ohio

LETTERS

(Concluded from page 10)

ticles: "Know Your Costs" (Mar. 19, 1956, page 83); "It's Time To Grow" (Feb. 13, 1956, page 81); and "Keep Your Product Growing" (Nov. 14, 1955, page 101).

Stanley Mitchell Kolsan
Statistician
Market Research
General Merchandise Co.
Milwaukee

Request for More Reprints

Thank you for sending six copies of your article, "What Makes a Good Deep Drawing Steel" (Apr. 22, page 78). We have found it helpful and would appreciate 12 more copies.

John Bridgewater
Republic Steel Corp.
St. Louis

Foremen To See Editorial

Your editorial, "Formula for Leadership" (May 13, page 67), has been called to my attention as an item which would be good to put in our Foremen's Club magazine, *NMA-ACF Newsette*. May we have permission to reprint?

Lloyd H. Adams
Editor
NMA-ACF Newsette
ACF Industries Foreman's Club
American Car & Foundry Division
ACF Industries Inc.
Berwick, Pa.

• *Permission granted.*

How To Fight Creep

Please forward two copies of the excellent article, "Creep and High Temperature Alloys" (May 27, page 108).

N. H. Cale
Technical Supervisor
American Metal Hose Division
American Brass Co.
Waterbury, Conn.

This article is an interesting and helpful one. Please forward a copy.

J. D. Simon
Prospect Plant
Cessna Aircraft Co.
Wichita, Kans.

Interested in Titanium

Your article, "Titanium Forming: 2.5 Million Lb of Experience" (May 20, page 178), proved to be of great interest. We would appreciate several reprints for our library.

D. C. Rowe
Manager, Tooling & Methods
Vertol Aircraft Corp.
Morton, Pa.

Excellent Yardstick

Please send a copy of your article, "Inventory Management" (May 13, page 109), the fourth in your 1957 Program for Management series. I have copies of the first three articles and find them an excellent yardstick.

W. H. Kindell
Manufacturing Engineering Unit
General Purpose Component Motor Department
General Electric Co.
Ft. Wayne, Ind.

We have just read this interesting and educational article, and would appreciate two copies.

L. J. Fox
Production Control
F.H.P. Motors
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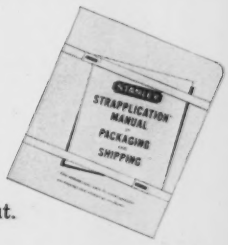
Peterborough, Ont.

Another **STANLEY STEEL STRAPPLICATION*** on the job

Annual savings in packaging...$35,000!

Estimated savings of $35,000 a year are reported by the Duriron Company, Inc., Dayton, Ohio since applying the Stanley Steel Strapping System to the packaging of Duriron Corrosion Resisting Pipe. Elimination of wooden crates meant lighter packages that lowered shipping costs. The great reinforcement strength of Stanley Steel Strapping minimized breakage and reduced damage claims.

Find out how you can enjoy similar results and savings.



WRITE FOR YOUR FREE COPY of the "Stanley Strapplication Manual of Packaging and Shipping" to **STANLEY STEEL STRAPPING**, Division of The Stanley Works, Dept. G, 1476 Lake Street, New Britain, Connecticut.

**The system-atic way to solve specific packaging and shipping problems*

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Got a wire problem?

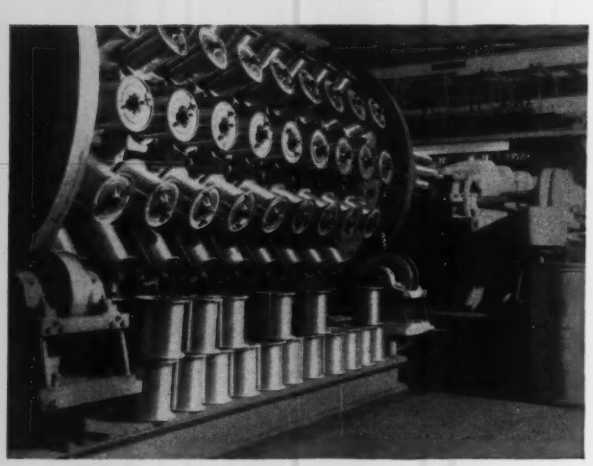
Commercial and industrial buildings must conform to an exacting set of fire and safety regulations. Glass areas are particularly troublesome because high winds and flying objects can fracture the glass and the fragments can slash a person to ribbons.

Fire can melt the glass and permit disastrous drafts that will fan a small blaze into a catastrophic fire.

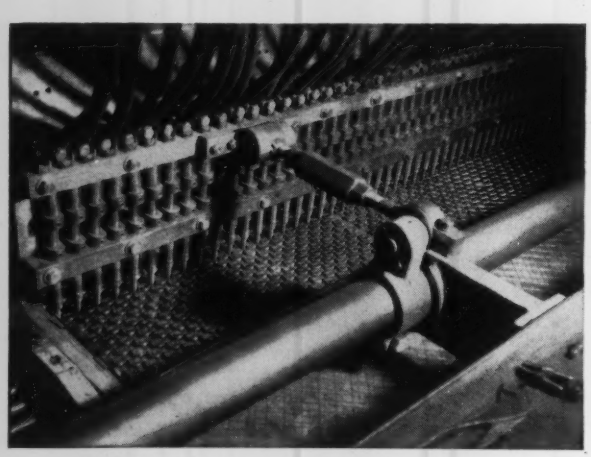
For these reasons, critical glass areas must be made from wire-reinforced glass. You've seen the old-style "chicken netting" wire glass. It's durable and strong, but it hardly fits in with the sleek decor of a modern building. Mississippi Glass Company (world's largest manufacturer of rolled glass) designed a new wire reinforcement using a simple, *welded* netting wire. They asked American Steel & Wire, "Could it be made?"

The wire had to be absolutely clean and free of dirt particles and moisture that would cause bubbles in the glass. Under these extreme cleanliness conditions, the wire had to be welded at every intersection, wire that was only .0204″ in diameter. Mississippi Glass Company designed a special machine, the only one of its kind in the world, that carries 127 spools of wire, weaves it into 66″-wide fabric, welds every joint, preserves the cleanliness and produces about two miles of netting every day.

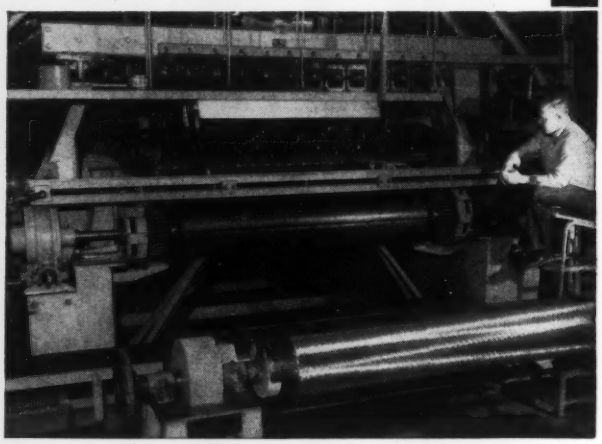
So if *you* have a tricky wire problem, recall that American Steel & Wire knows how to do things with wire. And at the lowest possible cost. Just call your AS&W representative.



Spool end of the weaving machine. We produce a special-finish Annealed Glass Netting Wire for this use.



Welding the joints in the netting. This is a difficult operation, requiring very careful control.



Delivery end of netting machine. The 66″-wide rolls are made in lengths of 500 feet.

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL, GENERAL OFFICES: CLEVELAND, OHIO

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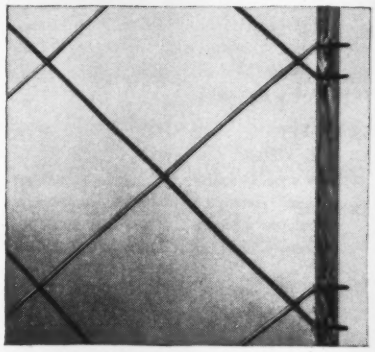
Look at this one!



This is the finished Polished Misco Wired Glass. Notice clean, simple appearance. Mesh is ¾-inch.

USS AMERICAN MANUFACTURERS WIRE

USS

AMERFINE—*high-quality fine wire.*
AMERSPRING—*music steel spring wire.*
AMERTEMP—*heavy-duty oil-tempered wire.*
AMERLOY—*alloy heading wire.*
AMERHEAD—*uniform heading wire.*
AMERSTITCH—*extra-tough metal stitching wire.*

UNITED STATES STEEL

BLACK WEDNESDAY at KNICKERBOCKER TRUST . . .

For the first 9 months, 1907 was the most prosperous year the United States had experienced — and then quite suddenly, on Wednesday, October 23rd, the big Knickerbocker Trust Company of New York failed after an unexpected wave of withdrawals exhausted their supply of cash. Immediately, other banks all over the Country suffered runs and failed. People rioted in the Bronx. Industrial firms were forced to use "John Doe Checks" (checks made payable to "John Doe," meaning 'cash') to meet payrolls, and merchants and others accepted these in lieu of cash. Almost overnight the Country went from boom to bust.

In this unfavorable atmosphere, John Christensen and Soren Sorensen came to Cincinnati to start their gear business. They weathered this storm and many others in the ensuing fifty years, and today The Cincinnati Gear Company is one of the Country's leading suppliers of custom gears. In fact, we won't take a back seat to *anyone* when it comes to quality and workmanship, as our many satisfied customers will attest. Why not try us for *your* next custom gear order?

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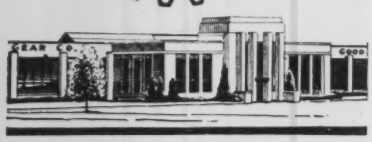

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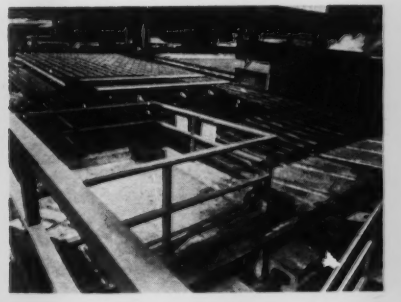

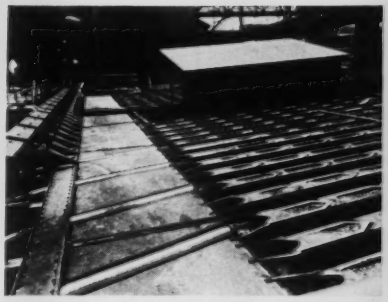

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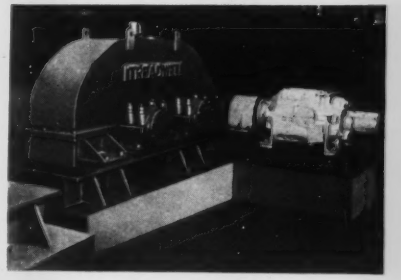

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Brainard Steel Strapping

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Brainard Steel Division, Sharon Steel Corporation
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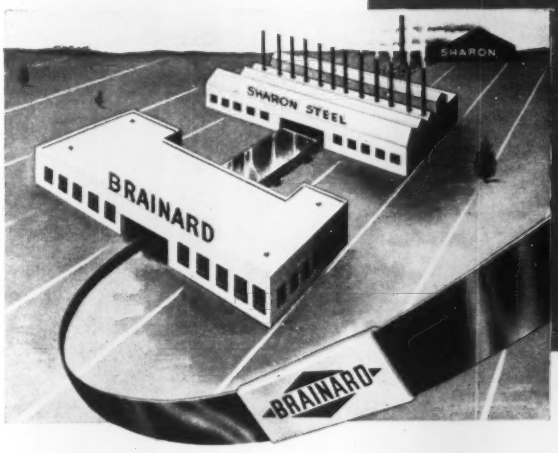
and THAT'S ONLY PART OF OUR STORY...



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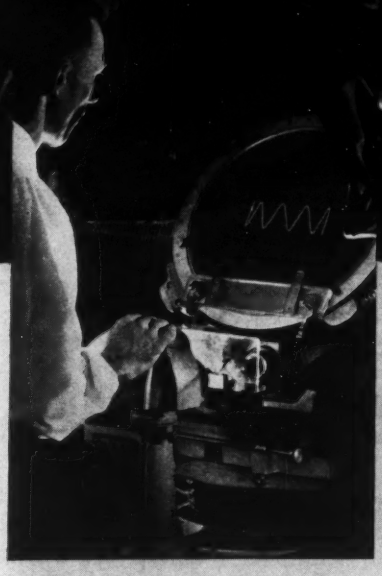

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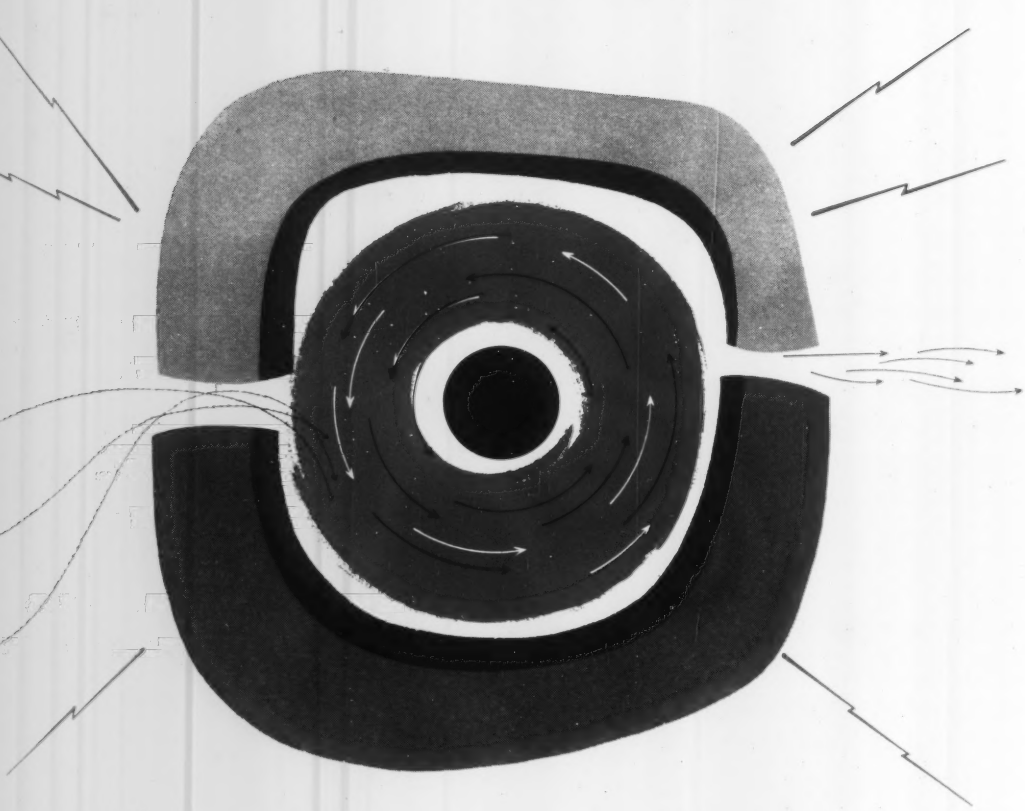

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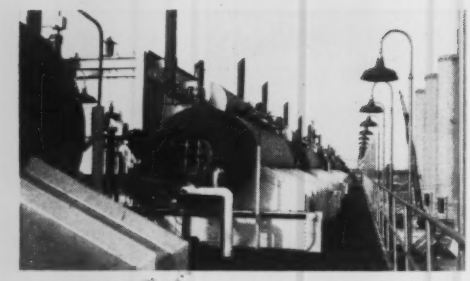

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CALENDAR
OF MEETINGS

July 16-17, Truck-Trailer Manufacturers Association: Summer meeting, Homestead, Hot Springs, Va. Association's address: 710 Albee Bldg., Washington 5, D. C. Secretary: John B. Hulse.

July 24-27, National Tool & Die Manufacturers Association: Summer meeting, Grove Park Inn, Asheville, N. C. Association's address: 907 Public Square Bldg., Cleveland 13, O. Executive secretary: George S. Eaton.

Aug. 12-15, Society of Automotive Engineers: West coast meeting, Olympic hotel, Seattle. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Aug. 20-23, Western Electronic Show & Convention: Cow Palace, San Francisco. Information: WESCON, 342 N. LaBrea, Los Angeles 36, Calif.

Aug. 28-30, American Institute of Electrical Engineers: Pacific general meeting, Chinook hotel, Yakima, Wash. Institute's address: 33 W. 39th St., New York 18, N. Y. Secretary: N. S. Hibshman.

Sept. 8-11, National Metal Trades Association: Eastern plant management conference, Essex-Sussex hotel, Spring Lake, N.J. Association's address: 337 W. Madison St., Chicago 6, Ill. Secretary: Charles L. Blatchford.

Sept. 9-11, American Mining Congress: Metals mining and industrial minerals convention, Utah and Newhouse hotels, Salt Lake City, Utah. Congress' address: 1102 Ring Bldg., Washington 6, D. C. Executive vice president and secretary: Julian D. Conover.

Sept. 9-12, Society of Automotive Engineers: Tractor meeting and production forum, Hotel Schroeder, Milwaukee. Society's address: 485 Lexington Ave., New York 17, N.Y. Secretary: John A. C. Warner.

Sept. 9-13, Instrument Society of America: Annual instrument - automation conference and exhibit, Public Auditorium, Cleveland. Society's address: 313 Sixth Ave., Pittsburgh 22, Pa. Executive director: William H. Kushnick.

Sept. 12-14, Automotive Parts Rebuilders Association: Annual meeting and exhibit, Congress hotel, Chicago. Association's address: 220 S. State St., Chicago 4, Ill. Executive secretary: Jack O'Sullivan.

Sept. 17-20, American Die Casting Institute: Annual meeting, Edgewater Beach hotel, Chicago. Institute's address: 366 Madison Ave., New York 17, N. Y. Secretary: David Laine.

Sept. 18-20, National Industrial Conference Board: Marketing meeting, Waldorf-Astoria hotel, New York. Board's address: 460 Park Ave., New York 22, N. Y. Secretary: Herbert S. Briggs.

Sept. 21-24, Steel Founders' Society of America: Fall meeting, Homestead, Hot Springs, Va. Society's address: 606 Terminal Tower, Cleveland 13, O. Secretary: George K. Dreher.

Sept. 22-24, American Machine Tool Distributors Association: Annual meeting, Hotel Cleveland, Cleveland. Association's address: 1900 Arch St., Philadelphia 3, Pa. General manager: James C. Kelly.

Sept. 22-25, American Institute of Wholesale Plumbing & Heating Supply Association Inc.: Annual meeting, Waldorf-Astoria hotel, New York. Institute's address: 402 Albee Bldg., Washington 5, D. C. Executive secretary: George T. Underwood.

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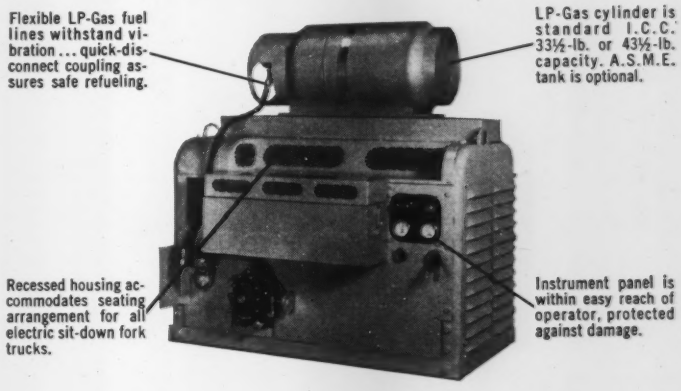
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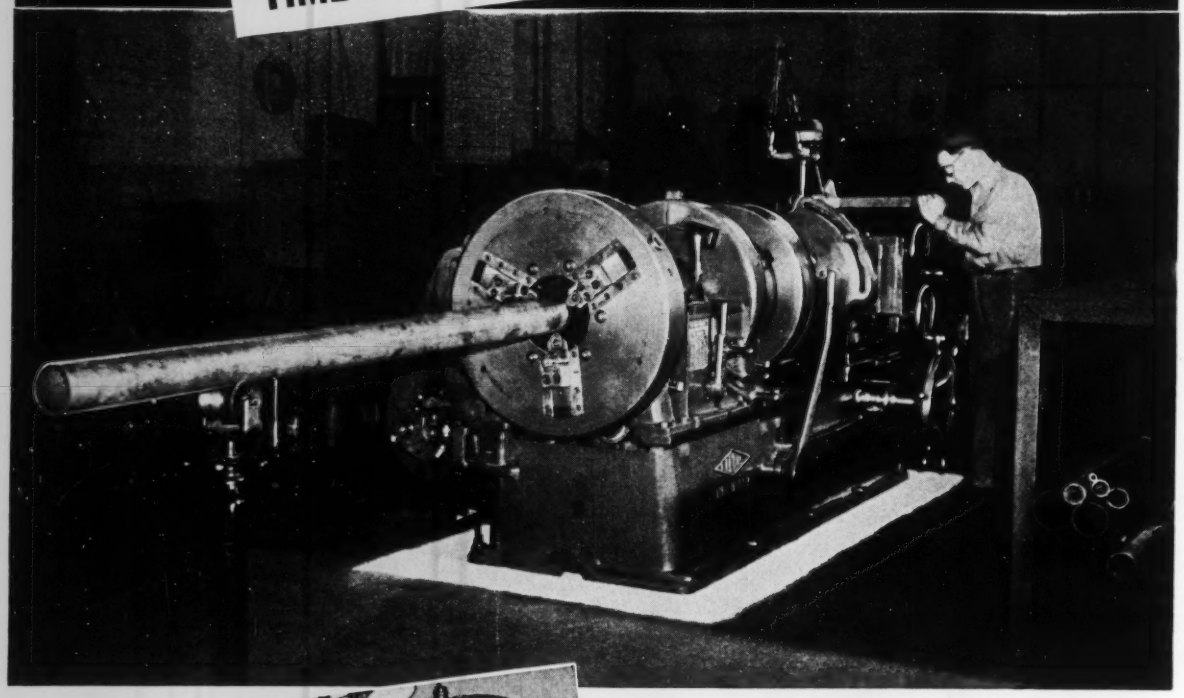
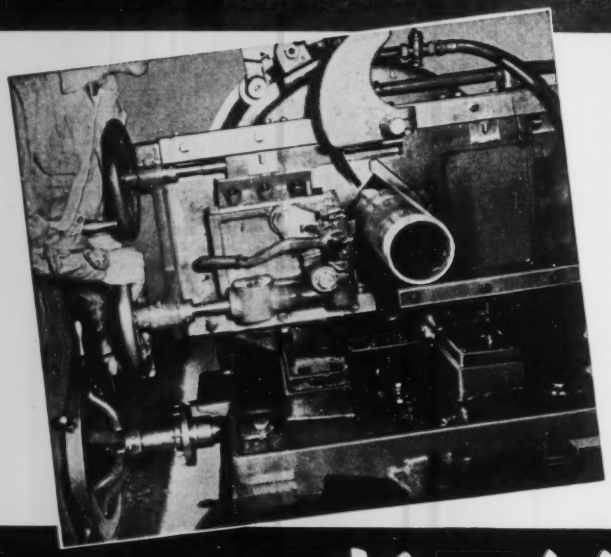
VERSATILITY

Saves TIME & MONEY in Maintenance Shops





Photographs show a Landis Pipe Threading Machine installation in a Job Shop of the New York Central Railroad. This shop, located at Weehawken, New Jersey, operates as a Marine Repair Shop handling maintenance for tugs, barges, lighters, etc. Illustrations show wrought iron pipe being cut off after reaming and threading. Standard pipe threads are cut 1½" long on the 4" pipe, using a cutting speed of 25 surface feet per minute. This machine is also used for cutting boiler tubes to length.

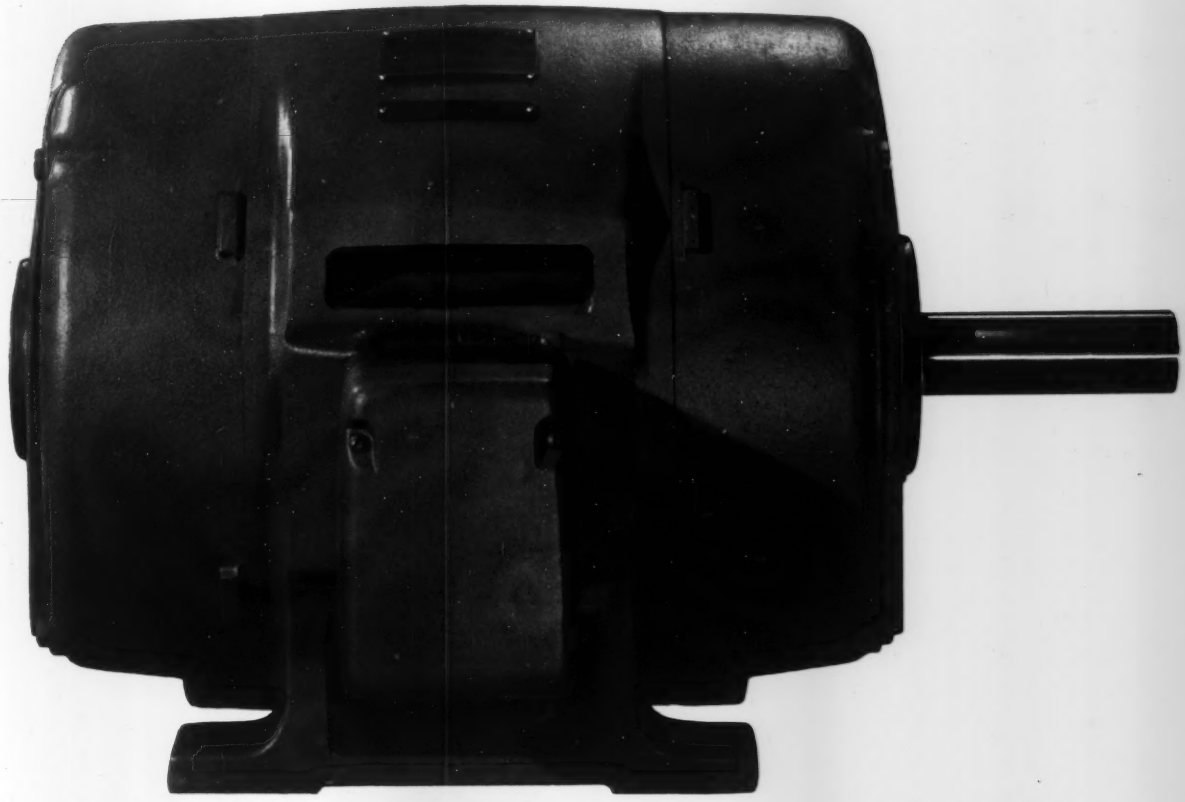
The wide diametrical range of the die heads and the use of patented tangential pipe chasers gives these machines a versatility invaluable in maintenance work. For example, the 6" Landis Pipe Threading Machine illustrated threads all pipe sizes from 1" to 6", inclusive. Size adjustment of the die head is simple and quick. Chasers need not be changed except for threads of a different pitch, form, or taper. Chasers are interchangeable and need only be replaced singly as needed. Tangential cutting action reduces wear, and chasers can be reground to use over 80% of their length. Write for Bulletin C-61.

LANDIS *Machine* COMPANY

WAYNESBORO · PENNSYLVANIA · U. S. A.

NEW

FROM GENERAL ELECTRIC



TRI 55 CLAD MOTORS

REG. U.S. PAT. OFF.

NOW UP TO 125 HP

GENERAL ELECTRIC

compact . . . power-packed

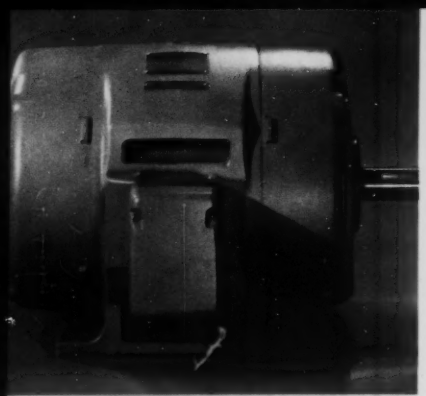
General Electric TRI 55 CLAD

REG. U.S. PAT. OFF.

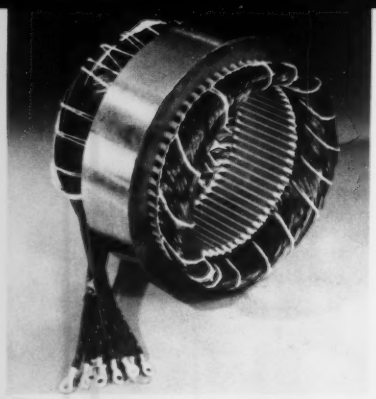
NOW UP

DRIPPROOF

DESIGNED, BUILT AND TESTED FOR

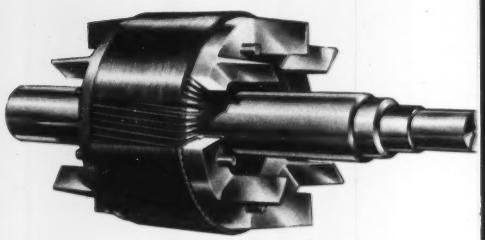


FULLY PROTECTED by cast-iron enclosures, Tri-Clad '55' motors handle many jobs where ordinary drippproof motors cannot be applied.



MYLAR* slot insulation, Formex® wire, non-wicking Geoprene® leads and Dri-Film® silicone coating increase stator life up to 50%.

*Registered Trade-mark Dupont Co.



IMPROVED ROTORS are solid cast of pure aluminum for greater strength, higher conductivity. Rotor bars are insulated from core to improve motor efficiency.

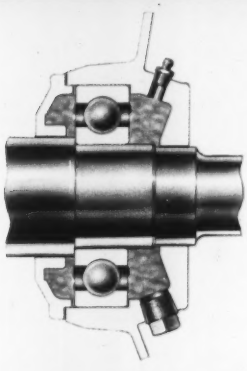
GENERAL ELECTRIC

Motors in New NEMA Ratings

TO 125 HP

TOTALLY ENCLOSED

LONGER LIFE, EASIER MAINTENANCE



BEARING SYSTEM uses over-size ball bearings, synthesized grease, long, close-running seals to extend motor life.

PERMA-NUMBERED LEADS and roomy conduit box facilitate motor hook-up. Knock-off lugs speed end shield removal for motor inspection.

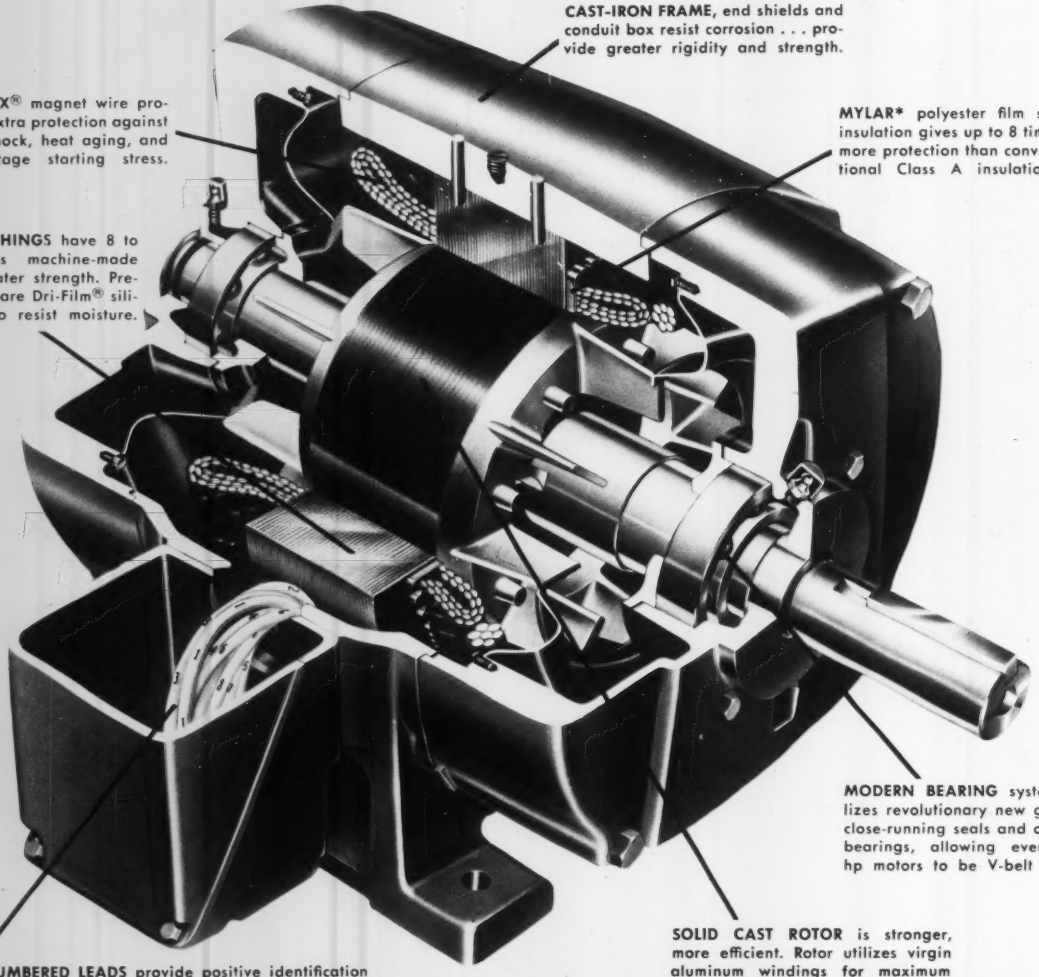
GENERAL ELECTRIC Tri-Clad '55' motors must pass a series of sound, vibration and hi-potential tests prior to shipment. Rigid tests assure uniform high-quality, and long-life performance.

TRI-CLAD motors give you top performance. Here's why . . .

compact . . . power-packed

Only G-E *TRI* 55 *CLAD* motors give you all these years-ahead benefits

REG U S PAT OFF



CAST-IRON FRAME, end shields and conduit box resist corrosion . . . provide greater rigidity and strength.

FORMEX® magnet wire provides extra protection against heat shock, heat aging, and full-voltage starting stress.

MYLAR* polyester film slot insulation gives up to 8 times more protection than conventional Class A insulations.

STATOR PUNCHINGS have 8 to 16 continuous machine-made welds for greater strength. Pre-wound stators are Dri-Film® silicone-treated to resist moisture.

MODERN BEARING system utilizes revolutionary new greases, close-running seals and oversize bearings, allowing even 125-hp motors to be V-belt driven.

PERMA-NUMBERED LEADS provide positive identification even when taped, or if terminals have been clipped.

SOLID CAST ROTOR is stronger, more efficient. Rotor utilizes virgin aluminum windings for maximum conductivity, better performance.

*Registered Trade-mark Dupont Co.

FOR COMPLETE INFORMATION

Section 891-3
GENERAL ELECTRIC COMPANY
Schenectady 5, New York

Please send me the following publications:

☐ **FREE BULLETIN** (GEA-6602) describing the many advanced features of new Tri-Clad '55' motors up to 125-hp.

☐ **FREE SLIDE RULE** (GEN-148) to determine weight and space-saving benefits of new Tri-Clad '55' motors.

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

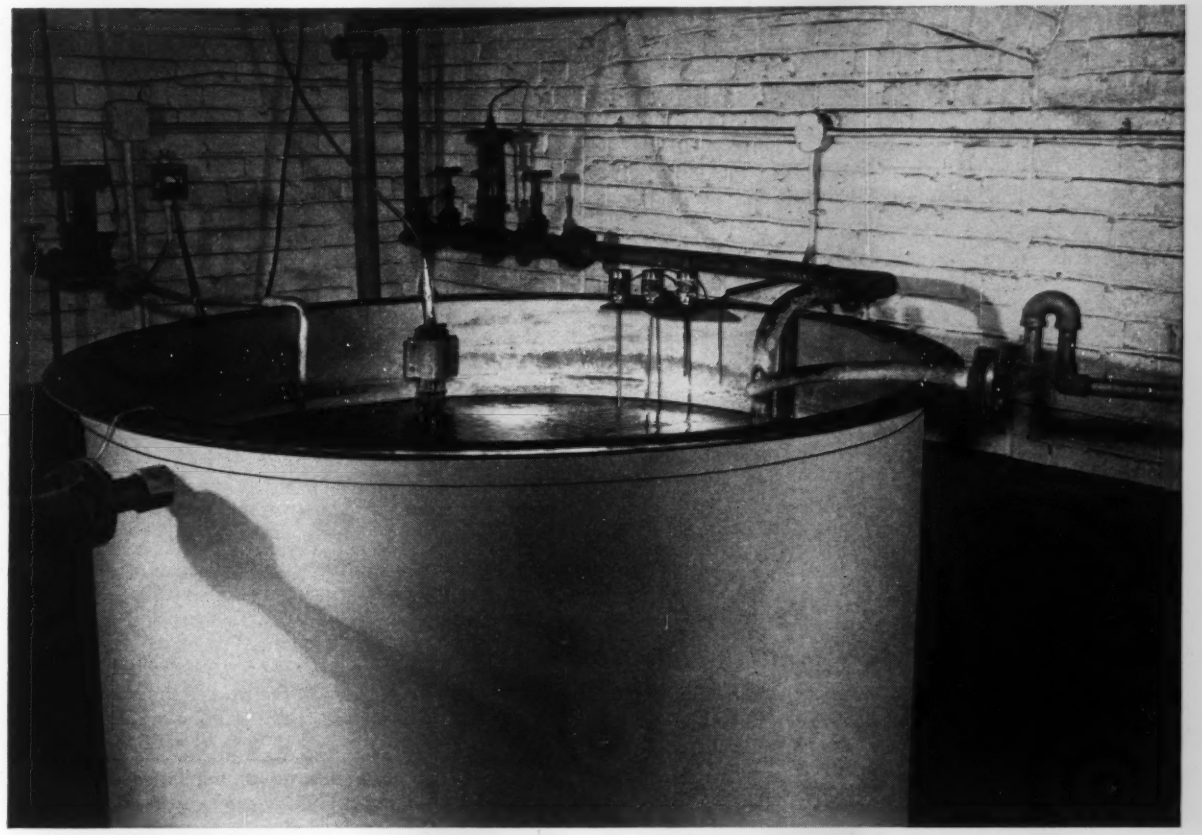
CITY & STATE _____

FOR COMPLETE DETAILS on the new line of Tri-Clad '55' motors up to 125 hp, contact your local G-E motor distributor or the motor specialist at your nearby General Electric Apparatus Sales Office. They will give you expert assistance in selecting and applying the right motor for your particular application.

For free slide rule to determine weight and space-saving benefits of the new motor, and for informative General Electric Tri-Clad '55' motor bulletin, please send attached coupon.

Progress Is Our Most Important Product

GENERAL ELECTRIC



Another plant tames sulphuric acid with *Carpenter* Stainless No. 20 and No. 20Cb

An automatic sulphuric acid dilution system, with Carpenter Stainless No. 20 and No. 20Cb preventing corrosion at critical points, is cutting acid costs and reducing dangerous acid handling for a Tennessee textile plant. Savings with the system in its first year of operation equaled the total initial cost. Carpenter No. 20 and No. 20Cb control corrosion attacks of H_2SO_4 concentrations up to 23% in a cutting tank (shown above), piping and pumps.

Whether you have sulphuric acid solutions or other strong corrosives to handle, see how Carpenter Stainless No. 20 and No. 20Cb can help you cut corrosion costs by keeping acid handling equipment on the line longer.

Write for a copy of the Carpenter Stainless No. 20 and No. 20Cb handbook containing physicals, corrosion resistance and fabrication data.

These super corrosion-resistant alloys are available in tubing, pipe, sheet, plate, bars, strip, wire and billets to meet your exact requirements.

See your nearest Carpenter Distributor for full information and help on your particular application for Carpenter Stainless No. 20 and No. 20Cb.

MEMBER

The Carpenter Steel Company, Alloy Tube Division, Union, N. J.

Export Dept.: The Carpenter Steel Co., Port Washington, N.Y.—"CARSTEELCO"

Carpenter

more than corrosion resistance

Stainless No. 20 & No. 20Cb

Carpenter No. 20 bars, strip, wire and billets are available also from The Carpenter Steel Company, Reading, Pa.

MICRO SWITCH . . . FIRST IN PRECISION SWITCHING

HONEYWELL

Consider the many features of this small limit switch

Compact—Completely Sealed—Double-Pole, Two Circuit—Operating Force Only 3 Pounds Maximum

This LS series switch is extremely small for a limit switch of such ruggedness. It is a double-pole, two-circuit switch but can be used single-pole double-throw.

The housing is of heavy cast aluminum. Four mounting holes in the flanged portions of the casting—not through the switch cavity—assure vibration-proof installation. The cover screws and lock washers are held captive in the cover when cover is removed. They cannot drop out. Cover seal is cemented to the cover—it is always there.

Four .192 in. diameter mounting holes extend through the enclosure. They are tapped from the back to a depth of 9/16 of an inch with ¼-20 nc thread. They accept No. 10 screws. Switch can be mounted from either front or back side.

The switch is fitted with No. 8 terminal screws which easily accommodate No. 14 stranded wire.

Full details will be found in Catalog 83.

CHARACTERISTICS

Operating force—3 lbs. max. Pretravel—20° max. Full overtravel force—6 lbs. max. Differential travel—12° max. Release force—½ lb. min. Overtravel—30° min.

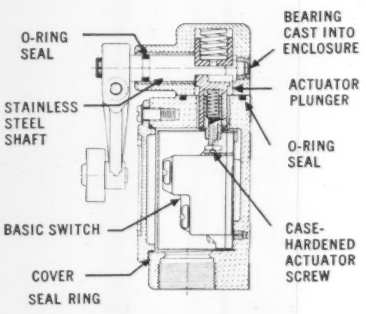
Rated: 10 amps. 120, 240, 480 vac; ½ H. P. 120 vac; 1 H. P. 240 vac; .8 amp. 115 vdc; .4 amp. 230 vdc; .1 amp. 550 vdc. Pilot duty rating 600 vac max.

Field Adjustable Through 360°

The strong, rugged actuator arm, fitted with either steel or non-sparking roller can be adjusted in the field through 360°. It can be securely locked in any position. It is designed to operate in either direction or in one direction only—clockwise or counter-clockwise. Simply remove the actuator head and rotate the notched plunger 90°. Head may be rotated to provide actuation from any of four quadrants.

The LS is Completely Sealed

Note the illustration at the right. It shows the features of the switch and the thorough sealing provided by the use of O-ring seals on the actuator shaft and between the actuator head and the housing. A synthetic rubber seal on the cover never becomes loose—it is sealed to the cover. These seals provide maximum protection against dust, lint, oil and other liquids.



Any MICRO SWITCH Field Engineer can assist you in designing the LS into your product—or call an Authorized Distributor as to how you can modernize present equipment.

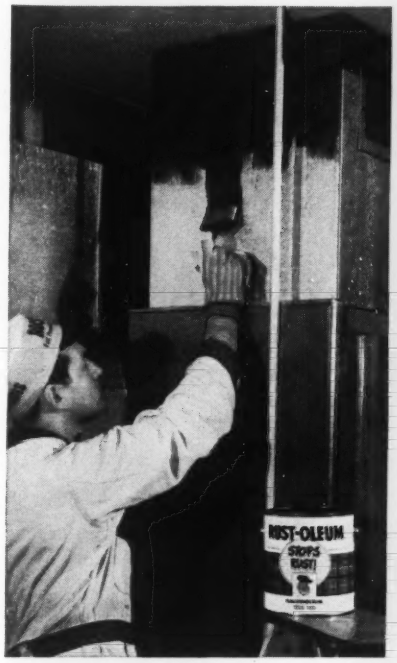
MICRO SWITCH

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

HONEYWELL

In Canada, Leaside, Toronto 17, Ontario • FREEPORT, ILLINOIS

A coating in COLORS that really sticks to new Galvanized, Aluminum and Terne Plate



RUST-OLEUM® GALVINOLEUM® COATINGS

Remember? If you didn't go over every square inch of new galvanized metal with a chemical solution before painting . . . chances are that the paint "peeled off" leaving you with a costly eye-sore!

The development of Galvinoleum Coatings by Rust-Oleum changes all this! *Now* . . . you simply brush Galvinoleum right over brand new or unpainted Galvanized, Aluminum, or Terne Plate . . . no etching . . . no weathering . . . and it *lasts and lasts!* No "peeling" worries, no costly "headaches"... you have your choice of Red, Gray, Green, and Metallic! And you can use Rust-Oleum 575 Outside White, or any high-quality oil base house paint, over the Galvinoleum to match trim.

Pioneered, developed and field-tested by the Rust-Oleum Corporation — you have the assurance of a *brand name* backed by over thirty-five years of proved performance throughout industry. Try Galvinoleum ... write for your illustrated Galvinoleum booklet with color charts.

RUST-OLEUM®

STOPS RUST!®

Rust-Oleum, Galvinoleum, and Stops Rust are brand names and registered trademarks of the Rust-Oleum Corporation.

Prompt delivery from Industrial Distributor Stocks.

Rust-Oleum is distinctive as your own fingerprint. Accept no substitute.

ATTACH COUPON TO YOUR LETTERHEAD—MAIL TODAY!

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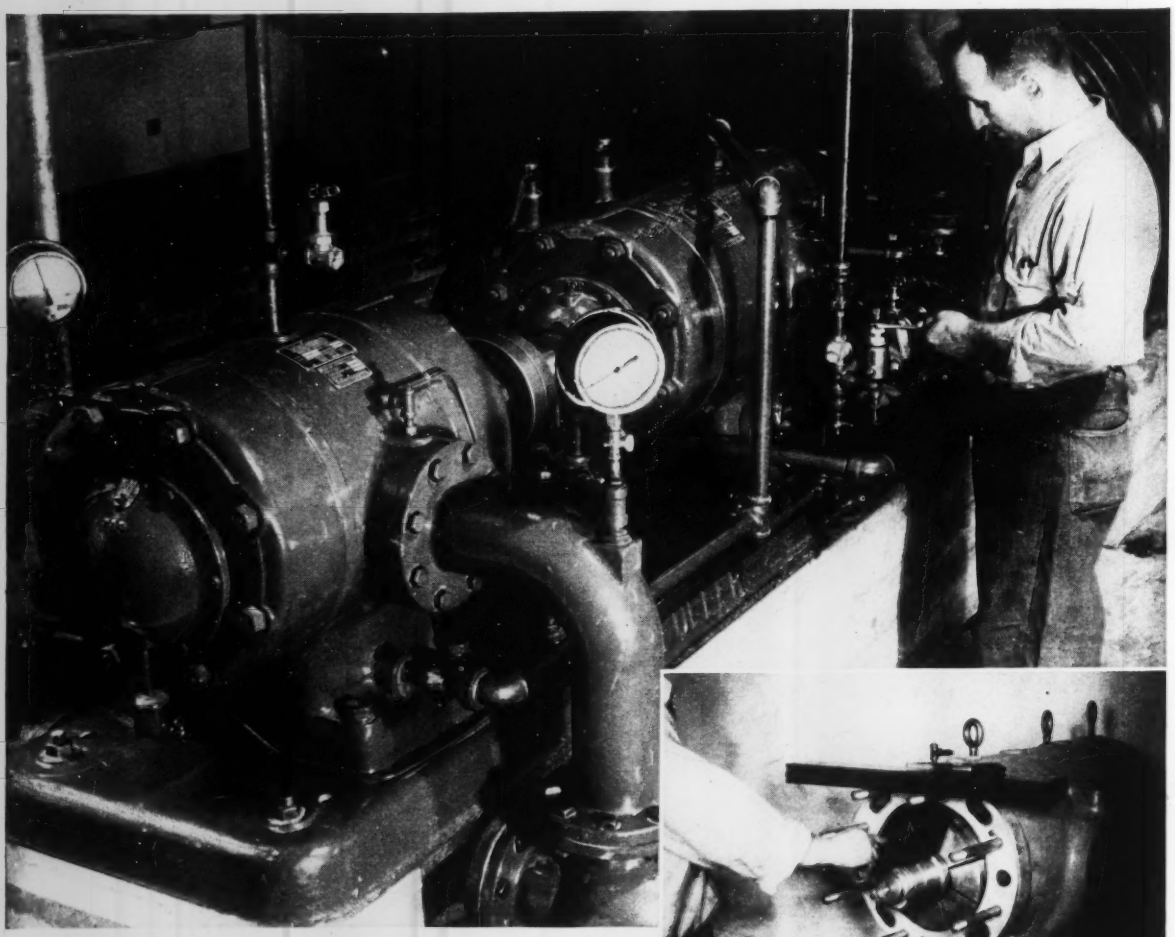
2512 Oakton Street • Evanston, Illinois

- ☐ Complete Rust-Oleum Galvinoleum Literature With Color Charts.
- ☐ Free Test Sample:
  ☐ Red ☐ Gray ☐ Green ☐ Metallic
- ☐ Nearest Source of Supply.



Blade inspection

PERFECT COMBINATION OF MEN AND MACHINES

Providing plant air for varied uses imposes heavy responsibility on both the compressor and its operator to keep production moving.

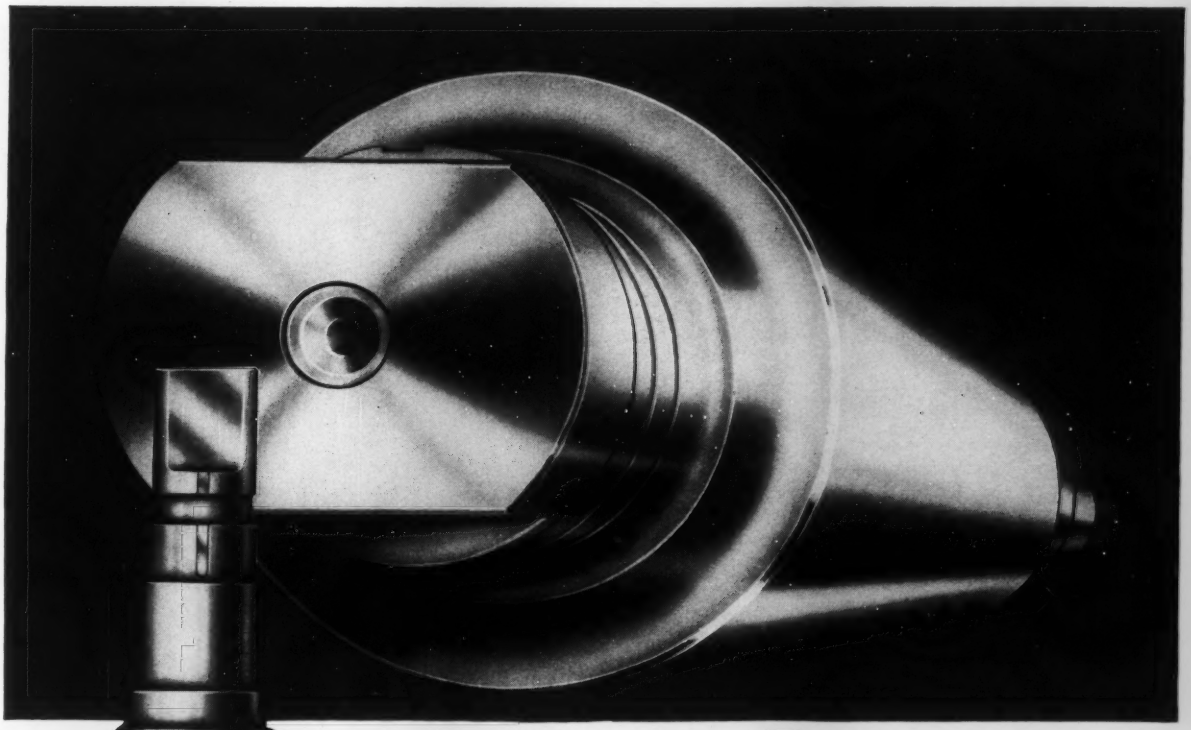
The simplicity of the Fuller Rotary Compressor principle reduces maintenance to an absolute minimum; by the same token, operator's universal pride in Fuller Rotary performance contributes to longer life of the compressor. Few moving parts and smooth operation limit the operator's work to periodic inspection.

This perfect combination of men and machines is worth investigating, with an eye to economies you, too, can enjoy. Write to Fuller Company, compressor sales department for detailed information.

FULLER COMPANY
160 Bridge St., Catasauqua, Pa.
SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION
Birmingham · Chicago · Kansas City · Los Angeles · San Francisco · Seattle

C-316
4686

PIONEERS OF HIGH-EFFICIENCY VANE TYPE ROTARY COMPRESSORS SINCE 1930



experience

...one of the unseen extra values you get in every

NATIONAL ROLL

In the final analysis, the quality of a roll is determined by the experience of the maker . . . Experience in metallurgy, experience in casting, experience in heat treating and machining.

For almost fifty years, National has been making rolls for the metal industry throughout the country. And now this experience is backed by the years of metallurgical experience of National's parent organization, General Steel Castings Corporation.

Such experience is your assurance of the best in iron and steel rolls . . . rolls that will give you dependable service, higher tonnages and longer life. Try National rolls and see.

GENERAL STEEL CASTINGS CORPORATION

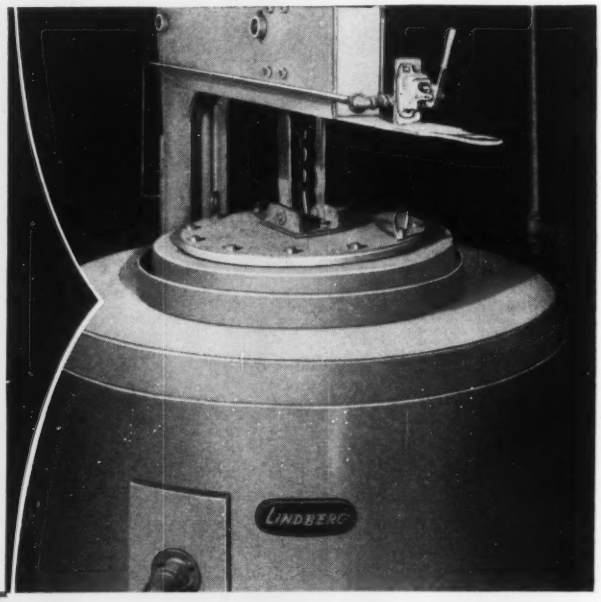
NATIONAL ROLL & FOUNDRY DIVISION

Avonmore (Westmoreland County) Pennsylvania

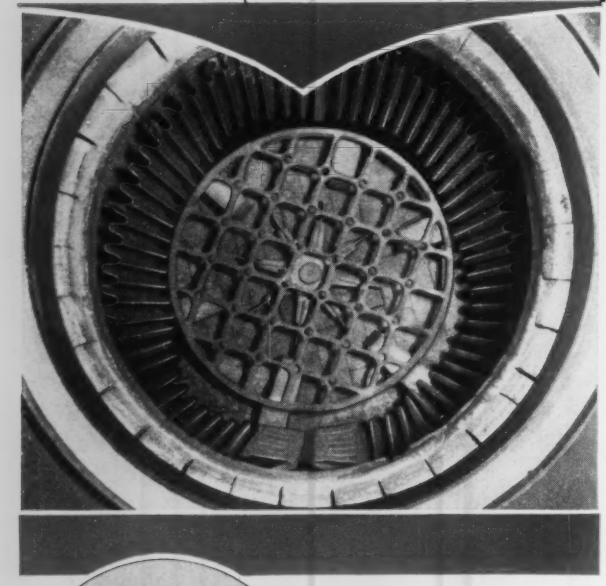
General Steel Castings Corporation: General Offices, Granite City, Ill.
Plants: Granite City, Ill.—Eddystone, Pa.—Avonmore, Pa.

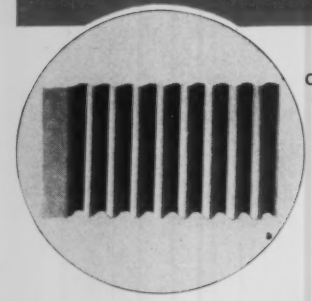
FROM THE OUTSIDE

. . . JUST ANOTHER LINDBERG PIT-TYPE CARBURIZING FURNACE

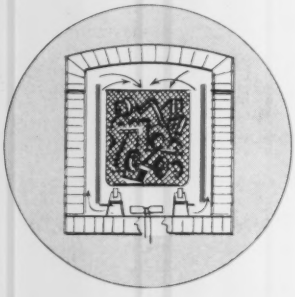


BUT LOOK INSIDE





CORRTHERM elements operate on extremely low voltage. No leakage through carbon saturation. Shock or short hazards eliminated. No complicated mountings required. An exclusive Lindberg development.



Note how CORRTHERM elements serve as baffles to direct forced convection streams through the charge.

No Retort!

Because it needs no retort, this new Lindberg electric vertical pit-type furnace gives you these important advantages:

- **Lower initial cost, no retort to pay for.**
- **No expensive retort replacement.**
- **Downtime for retort replacement eliminated.**
- **Increased production because it heats faster.**
- **Exact atmosphere control maintains work quality.**
- **Versatile, carbon-diffusing and requenching along with carburizing. Adaptable to variety of work.**

All this is made possible by Lindberg's new CORRTHERM electric heating element. For lower initial cost, lower maintenance costs, faster production, better quality control, why not look into this furnace. It's additional evidence that, if you're concerned with the application of heat to industry, better talk it over with Lindberg.

LINDBERG
ENGINEERING COMPANY

2441 West Hubbard Street, Chicago 12, Illinois

Los Angeles Plant: 11937 S. Regentview Ave., at Downey, Calif.
Toronto Plant: EFCO-Lindberg, Ltd., 11 Front Street, East

. . . Your best motor investment is Century

Problems in motor application? Solve 'em right here!

The best testimonial to Century's broad range of motor types and sizes, and skillful application engineering is this: Customers stay with us. Order after order. Year after year.

That points to one thing: Equipment Manufacturers and users make money through Century motor performance, long life, dependability. That's one of the reasons for Century growth and present capacity, typified by the modern St. Louis headquarters plant shown here.

Century motors, from 1/20 to 400 HP, cost you no more, yet give you a lot more. Want to talk about it from *your* viewpoint? Call your local Century man or Authorized Century Distributor.

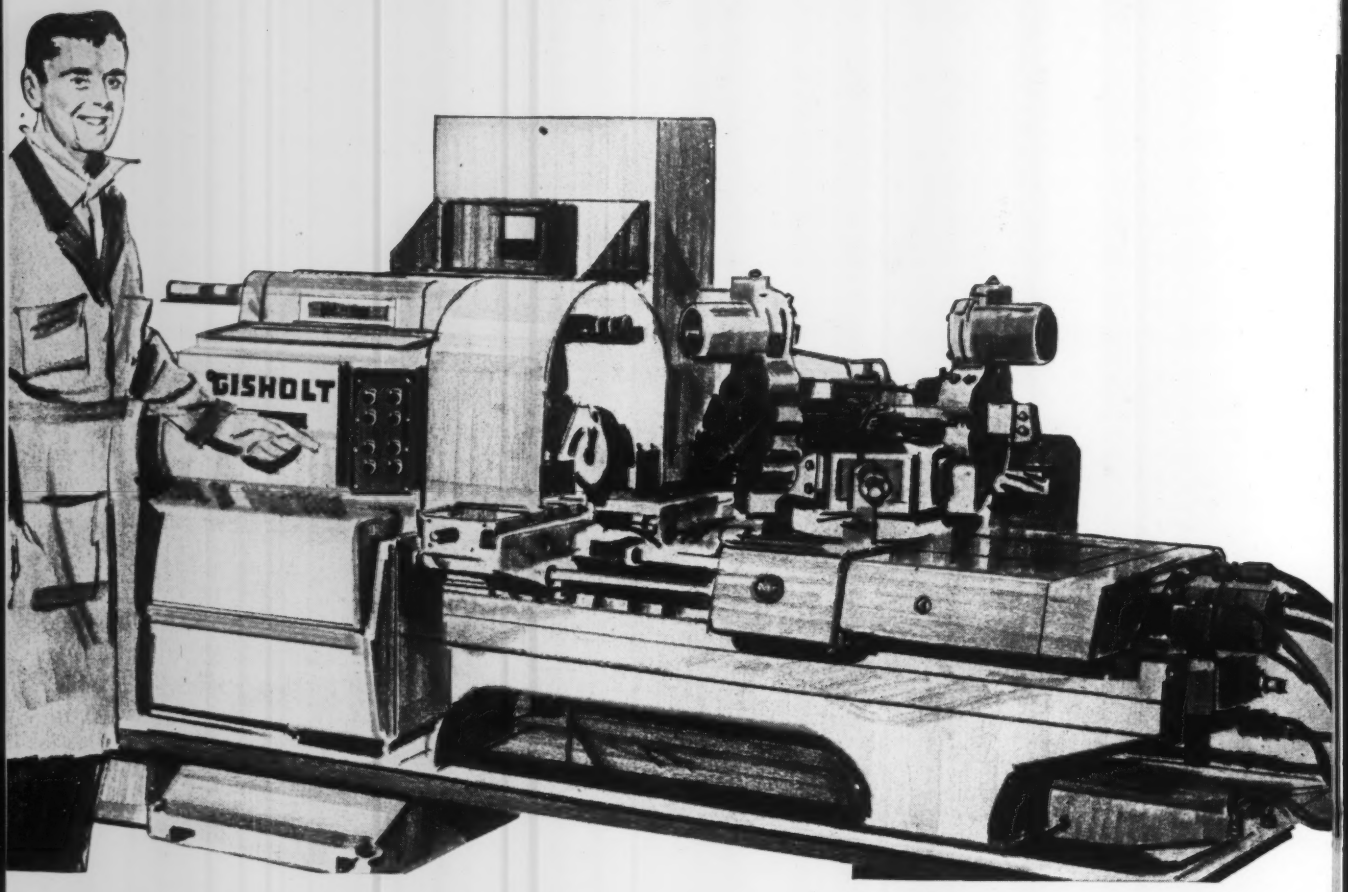
Century
MOTORS

CENTURY ELECTRIC COMPANY

St. Louis 3, Missouri • Offices and Stock Points in Principal Cities

NEW Gisholt Fastermatic

CUTS YOUR SETUP TIME



GISHOLT
MACHINE COMPANY
Madison 10, Wisconsin

MASTERLINE
GISHOLT SINCE 1887

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • PACKAGING MACHINES • MOLDED FIBERGLAS PLASTICS

control panel

50% OR MORE

BY SIMPLY FLIPPING TOGGLE SWITCHES, your operators can cut automatic turret lathe setup time 50% or more with this electric setup control panel.

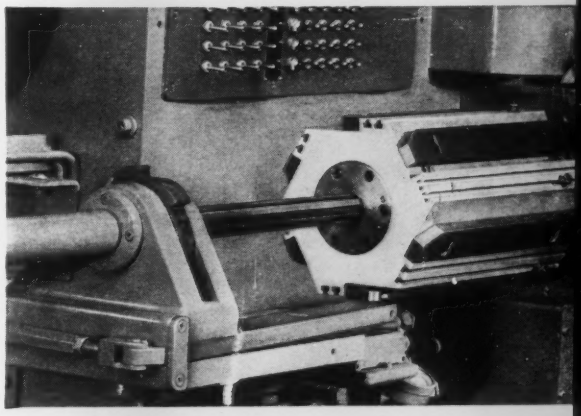
Thoroughly proved in production lines, this control panel is one of the many advanced features available on the new Gisholt MASTERLINE Fastermatic Automatic Turret Lathe.

Here's how the panel works: within finger-tip reach, your operator has a horizontal row of toggle switches for each face of the hexagon turret. By simply flipping the switches right or left, he pre-selects desired machine functions. Re-runs? Here the Fastermatic makes even more drastic cuts in setup time. A master reference card, made from the previous run, is used, and the machine is ready to go with absolute minimum preparation. Feed changes are fast and easy. Tool overhang is quickly minimized by re-positioning the saddle. Anywhere within the machine cycle, the operator can make a trial cut, withdraw the tools, mike the part, re-set the tools and resume forward feed.

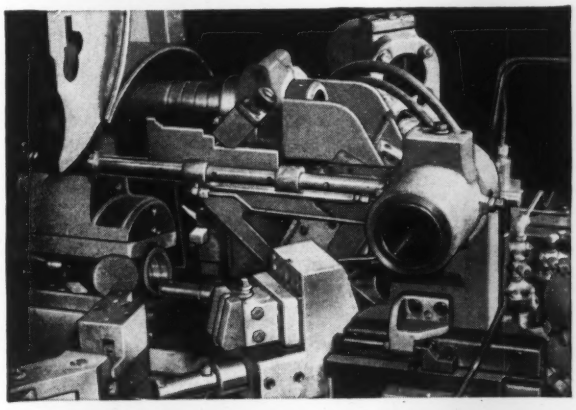
What does this versatility mean to your own operations? It means more time spent cutting chips and more profit per piece. It means that less skill is required of the operator and he is free to handle additional units or do other work during machining cycles. It means you can utilize smart tooling and eliminate human errors...get record production on long runs ...*and also get the advantages of automatic cycle operation on relatively short runs.*

Ask your Gisholt Representative to tell you about the Fastermatic's new electric control panel...its increased capacity...its higher speeds and feeds and heavier construction. You'll also want to know about using the Gisholt JETracer on the Fastermatic. Call him today—or write Gisholt for literature...ask for Bulletin No. 1179.

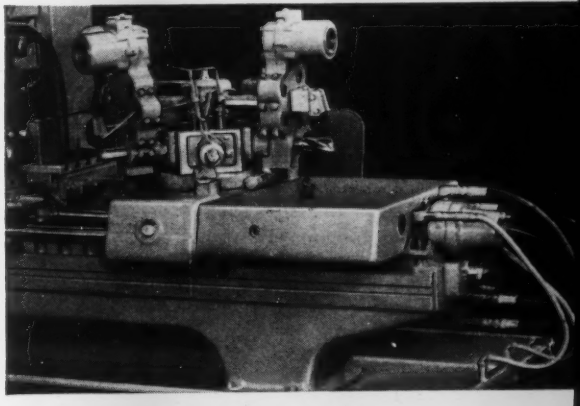
NEW GISHOLT FASTERMATIC CONTROL PANEL—simple toggle switches govern basic machine functions, cutting initial setup time in half. Master reference card is used to cut setup time still more on re-runs.



HEXAGON FEED CONTROL DRUM—positioning of adjustable flat bars on each face determines rate of feed. Thumbscrew actuator pins in slots on each face determine point of change from traverse to feed and length of feed.



GISHOLT JETracer—mounts on any one of Fastermatic's turret stations. Provides exceptional accuracy for turning, boring or facing—either straight, taper or contour. Hydraulically operated; stylus follows contour of template controlling movement of single-point tool on sliding member.



FASTERMATIC TURRET SADDLE is hydraulically powered for indexing and longitudinal movement. Automatic cycle easily set up with turret double- or triple-tooled. CROSS SLIDES—front and rear—operated by forward movement of turret saddle, can work independently, or together, with any turret face.

See what adhesives are doing today!

A MODERN FASTENER SPEEDS THIS ASSEMBLY LINE. IT NEEDS NO HOLES, BONDS PARTS INSTANTLY. IT'S 3M ADHESIVE EC-1357.

Simplifying the assembly line

A 3M adhesive is helping to create 50 shelves per hour right before your eyes. By bonding parts instantly, EC-1357 simplifies this assembly line to just four fast operations.

One worker puts metal frames and fiberboard sheets on a conveyor moving 9 feet per minute. The second sprays EC-1357 on both as they pass by. The third positions the boards on the frames. They pass under a pressure roller and the bond is complete. There are no extra fastening steps.

Instantly EC-1357 bonds board to frame so strongly that the fiberboard will delaminate if you try to remove it. A fourth man installs molding. The shelves are ready to ship immediately.

Hundreds of other 3M adhesives serve industry in a thousand varied uses.

SEE WHAT ADHESIVES CAN DO FOR YOU!

Learn how 3M research can speed your production, cut your costs. Consult your 3M Field Engineer. For a free booklet and more information write: 3M, Dept. 67, 417 Piquette, Detroit 2, Michigan.

PRODUCT OF 3M RESEARCH

3M® ADHESIVES

ADHESIVES AND COATINGS DIVISION, **MINNESOTA MINING AND MANUFACTURING COMPANY**

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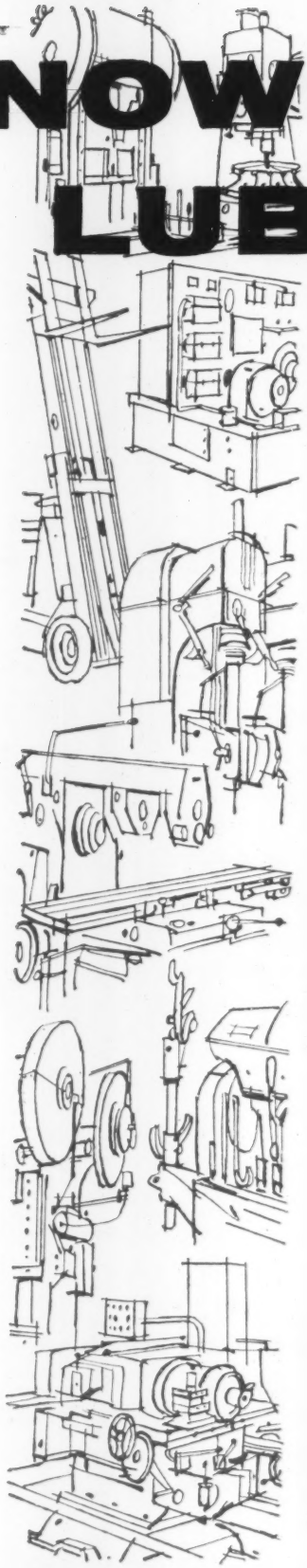
MAKERS OF "SCOTCH" BRAND PRESSURE-SENSITIVE ADHESIVE TAPES • "SCOTCH" BRAND SOUND-RECORDING TAPE • "SCOTCHLITE" BRAND REFLECTIVE SHEETINGS • "3M" ABRASIVE PAPER AND CLOTH • "3M" ADHESIVES AND COATINGS • "3M" ROOFING GRANULES • "3M" CHEMICALS

NOW! ATLANTIC LUBRICANT 54



. . . the one lubricant for practically every industrial need

New Atlantic Lubricant 54 is industry's closest approach to the universal grease lubricant. The use of this distinctively purple grease in your plant practically assures the correct choice in any application. It has given outstanding performance in all types of machinery.

Every shop, large or small, can make economical use of Atlantic Lubricant 54 because it gives

- . . . multiplicity of use—reduces chance for error, cost of warehousing, and handling
- . . . outstanding rust protection—protects ferrous surfaces under wet conditions
- . . . excellent lubrication performance from very low to extremely high temperatures
- . . . unusual stability against oxidation and softening under rugged working conditions
- . . . positive identification due to its purple color

This product is available from warehouses conveniently located throughout Atlantic's marketing territory and may be ordered through the nearest office listed below.

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1112 South Boulevard

STAINLESS STEEL MAKES THE DIFFERENCE

...its effect on modern castings

Through modern casting techniques, you can get all the useful qualities of stainless steel in everything from small intricate parts to large precise shapes.

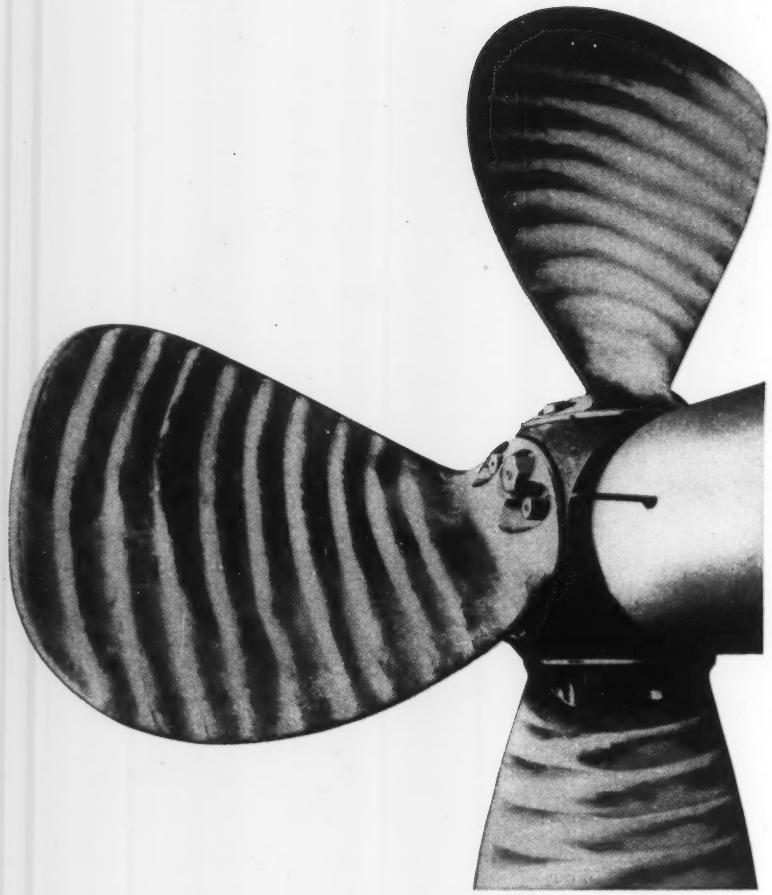
For example, stainless steel is giving giant ship propellers new toughness and resistance to corrosion and erosion. This means that peak speeds and efficiency can be sustained much longer. The "work hardening" property of stainless steel minimizes wear and cuts operating risks, too.

This combination of stainless steel and casting techniques gives design engineers a powerful tool to improve the effectiveness and "sales appeal" of their designs. For more information, write: ELECTRO METALLURGICAL COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y.

METALS DO MORE ALL THE TIME ...THANKS TO ALLOYS

Electromet
FERRO-ALLOYS AND METALS

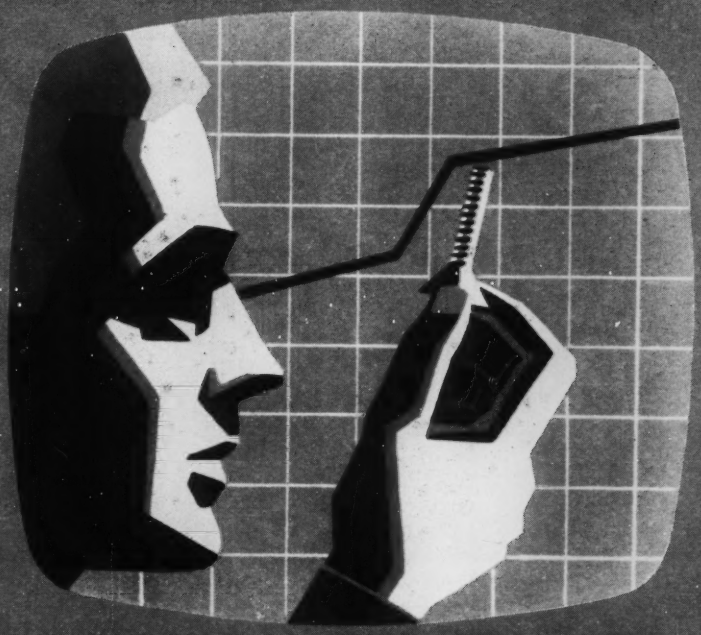
UNION CARBIDE



Ingeniously constructed of four blades and hub, cast separately and bolted together, this stainless steel propeller defies corrosion and erosion . . . maintains "original design" efficiency.

The terms "Electromet" and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

This membership seal means



consistent good quality in PHILLIPS CROSS-RECESSED HEAD SCREWS

Manufacturers of Phillips Cross-Recessed Head Screws who are entitled to the above seal do a good deal more than compete in selling these famous fasteners. They share quality control methods that bring worthwhile advantages to your assembly operations.

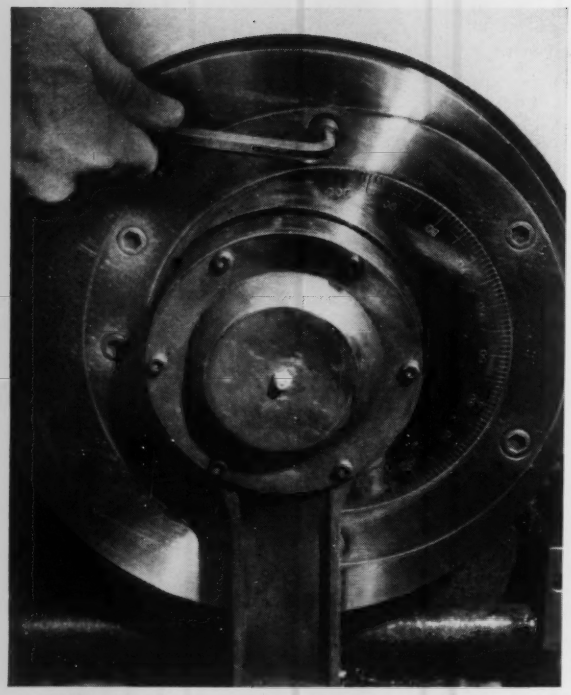
Consistent good quality fasteners for your product from these reliable sources are assured by common adherence to precision accuracy of dimensional standards, inspection gauges and gauging methods established by the Phillips Cross-Recessed Head Standards Committee sponsored by Screw Research Association.

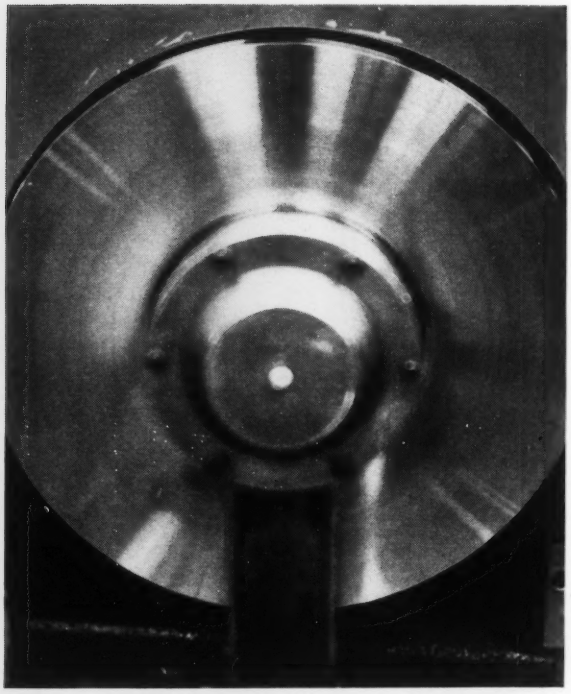
You can rely upon these sources for product reliability which assures correct mating fit between recess and driving point. This eliminates driver slippage and prolongs driver and bit life, improves product appearance and reduces your costs.

Members of Screw Research Association...

You can rely on these sources . . . for product reliability

American Screw Company • Atlantic Screw Works, Inc. • The Blake & Johnson Co. • Central Screw Company • Continental Screw Co. • Elco Tool and Screw Corporation • Great Lakes Screw Corp. • The H. M. Harper Company • The Lamson & Sessions Company • National Lock Company • The National Screw & Manufacturing Company • Parker-Kalon Division, General American Transportation Corporation • Pheoll Manufacturing Co. • The Progressive Manufacturing Company Division, The Torrington Company • Scovill Manufacturing Company • Shakeproof Division Illinois Tool Works • The Southington Hdwe. Mfg. Company Sterling Bolt Company • Universal Screw Company • Wales-Beech Corporation

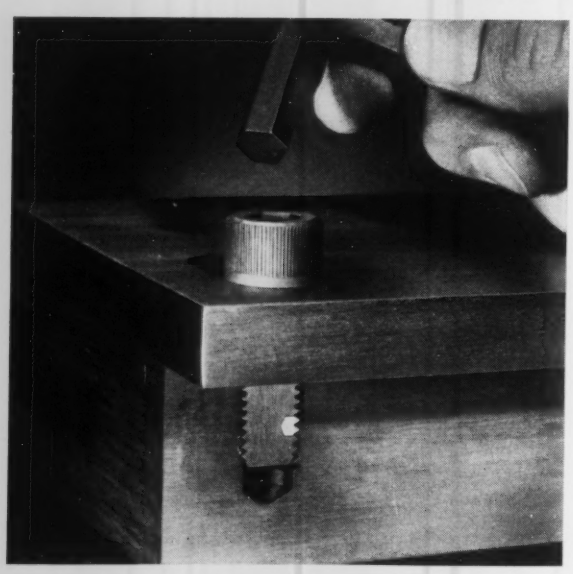




Self-locking UNBRAKO socket screws keep critical adjustments secure in the eccentric drive mechanism of this fatigue testing machine. Drive system delivers varying loads up to 15,000 pounds force to equipment under test at 1050 cycles per minute.

Vibration won't loosen Self-locking UNBRAKO socket cap screws

Screws with Nylok* device permit adjustments, keep precise settings during long test runs



HOW IT LOCKS. The tough, resilient Nylok locking pellet keys itself into the mating threads. It forces threads together, and locks the screw securely—whether or not the screw is seated.

UNBRAKO socket screws with the Nylok self-locking device stay tight under constant vibration.

Take the eccentric drive system in the fatigue testing machine illustrated above, for example. This machine must frequently run for periods up to 2 weeks or longer, day and night, to complete a single test. Loosening of the screws which are used to adjust the tension-setting mechanism could not only cause damage to the machine, but also make the test data worthless. Self-locking UNBRAKO socket head cap screws eliminate such problems.

An UNBRAKO socket screw with the Nylok self-locking device is a single unit. Just screw it into any tapped hole. Seated or not, it locks positively wherever wrenching stops. Constant vibration or pounding, or endless running of a machine, won't affect these self-locking UNBRAKOS. The screws will not work loose!

Write today for your copy of Form 2193, which gives complete catalog and technical data on the entire line of UNBRAKO socket screws with the Nylok self-locking device. Or see your authorized industrial distributor. Unbrako Socket Screw Division, STANDARD PRESSED STEEL CO., Jenkintown 33, Pa.

UNBRAKO SOCKET SCREW DIVISION

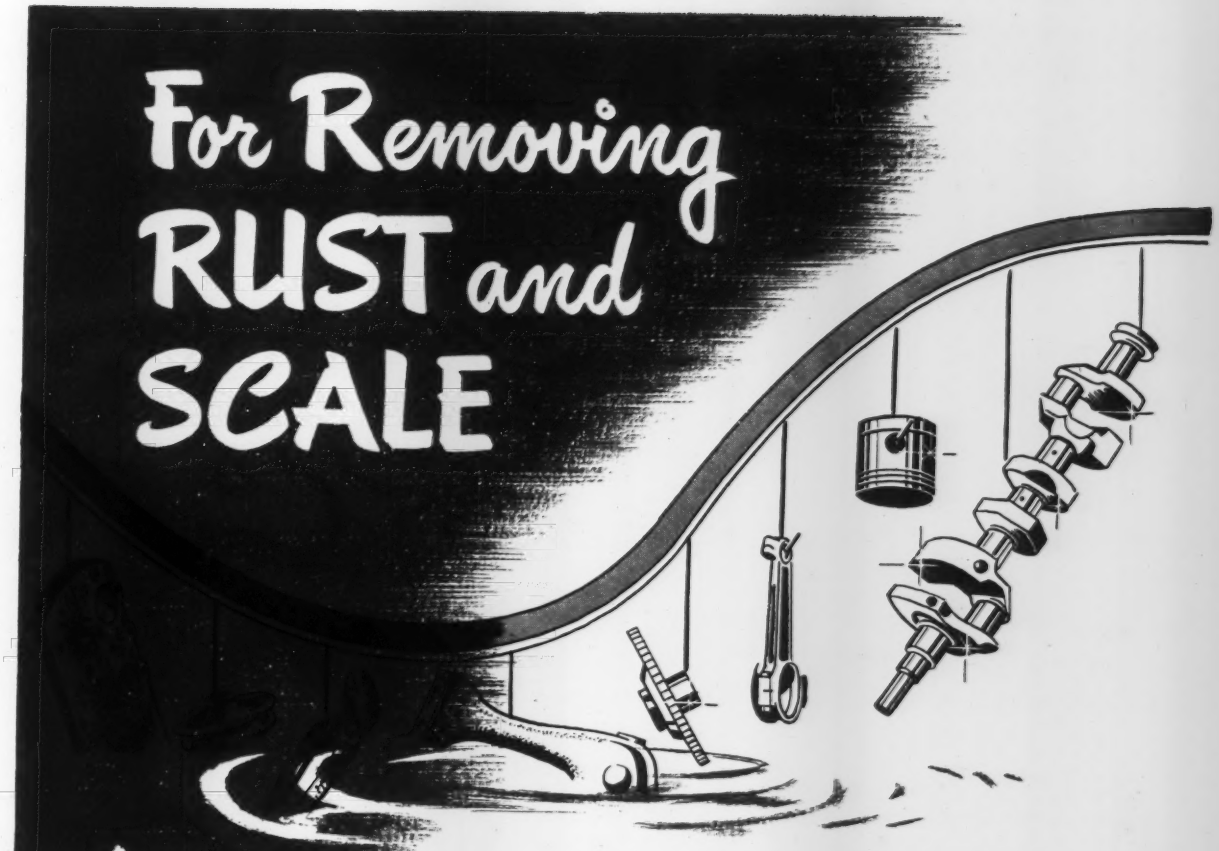
STANDARD PRESSED STEEL CO.

SPS

JENKINTOWN PENNSYLVANIA

*T.M. Reg. U.S. Pat. Off. The Nylok Corporation

For Removing RUST and SCALE



ALKA-DEOX® DERUSTING PROCESSES. Alkaline materials used both electrolytically and non-electrolytically for rapid removal of rust and scale from steel, cast iron and malleable iron. No attack on basis metal. Uses Enthone Alka-Deox 114 and Alka-Deox 134.

ENTHOL® — CLEANER AND RUST REMOVER FOR STEEL. A solvent acid cleaner for rapid removal of oil, rust and oxide from steel, zinc, aluminum and other metals to prepare them for painting or organic finishing.

DESCALER 2A — POWDERED ACID PICKLING COMPOUND. A powdered acidic compound added to water to make pickling solutions for iron and steel. Safer to handle than sulphuric acid. Gives controlled acidity to prevent overpickling.

ACTANE® 70 — POWDERED COMPOUND REPLACES HYDROFLUORIC ACID. A dispersing agent added to acid pickles to remove colloidal and siliceous films from metals. Also an additive for sulphuric and nitric acid pickles to promote faster pickling of stainless steel, aluminum and titanium.

INHIBITOR 8 — STOPS ACID ATTACK ON STEEL. An all-purpose inhibitor for acids including sulphuric and hydrochloric acids to stop attack on steel during pickling.

ACID ADDITION AGENT —STOPS ACID FUMES. A surface active material extensively used in acid pickles to reduce fuming, to give better wetting, and to promote better pickling.

Write for fully descriptive literature.

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Metal Finishing Processes • Electroplating Chemicals

Largest bronze centrifugal casting ever made, 54¾" O.D. x 49½" I.D. x 346½" long. Charge weight—72,300 pounds.

At Sandusky,

GIANTS ARE ROUTINE...

Small wonder. We serve giant industries . . . paper-making, shipbuilding, metalworking, atomic energy, petro-chemical, and others . . . with centrifugally cast cylinders and tubular parts, many of which can't be made by any other process to the exacting standards required.

It's the 47 years of specialized experience coupled with unequalled manufacturing facilities . . . that makes it routine for our engineers and production teams to cast and machine *cylinders from 7" to 54" O.D. and up to 33 feet in length* . . . in a wide range of alloys meeting special performance requirements.

Do you need a giant cylindrical form . . . or a small one . . . machined to exact working dimensions? Send us your specifications; we'll reply promptly.

Sandusky Centrifugal Castings offer you 4 important advantages:

1. ***SUPERIOR MECHANICAL PROPERTIES*** —to meet exacting design requirements
2. ***UNIFORM SOUNDNESS***—free from harmful inclusions and porosity
3. ***HIGHEST QUALITY***—to insure long, dependable, trouble-free service
4. ***JOB-READY CASTINGS***—machined to your exact specifications, eliminate extra costs from rejects, down-time, loss of production

CENTRIFUGAL CASTINGS

Sandusky Foundry & Machine Company

SANDUSKY, OHIO • *Stainless, Carbon, Low Alloy Steels—Full Range Copper-Base, Nickel-Base Alloys*

39 Sources

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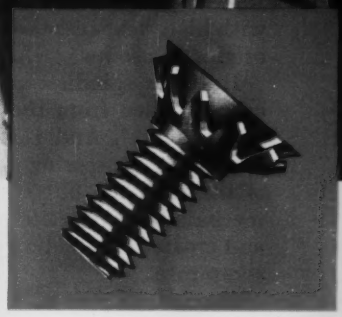
WALES-BEECH CORP.
Rockford, Illinois



For a perfect match, specify SHAKEPROOF® Lock Washers when ordering Sems. They're designed to lock tight and stay tight to guard against loosening vibration.

pre-assembly

speeds assembly to cut fastening costs

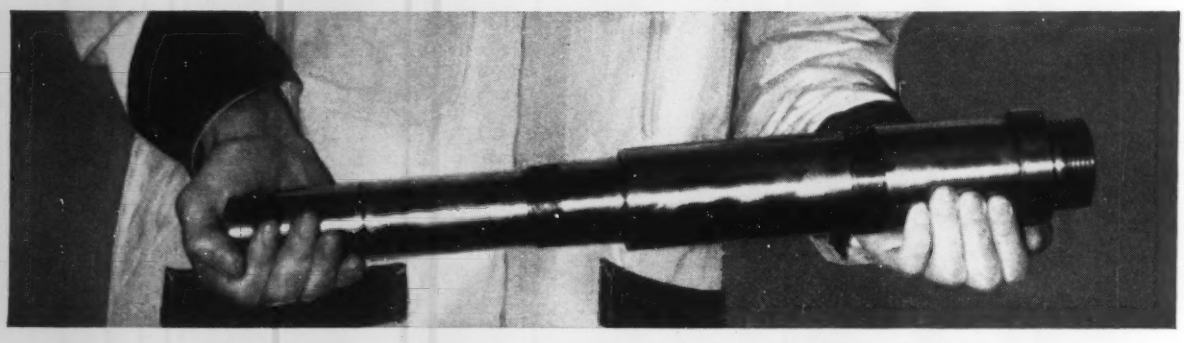
Pre-assembled Sems are a first step in cost saving automation. Often hopper fed in automatic driving, Sems save washer handling motions however used. Washers can't get lost, are never forgotten, can not be mis-matched to screw. Rejects are stopped, faster assembly given the go-ahead. Order Sems in the type and size you need.

Sems

pre-assembled screw and lock washer

Sems is a development of Illinois Tool Works, Chicago

Machining Costs Cut 25%
by switch to NEW RYCUT 50

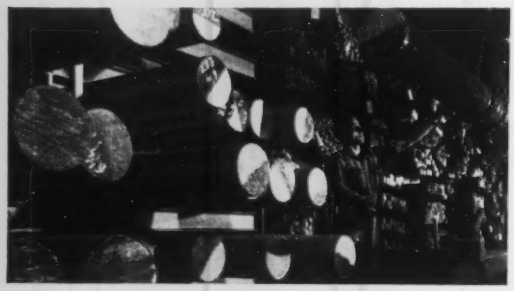


Logan Engineering Co. report shows how you can save up to 30% with a Ryerson leaded alloy

THE PROBLEM—This Chicago manufacturer of precision lathes faced a tough production problem from a time and cost standpoint. Lathe spindles have to be tough and hard with high wear resistance—so the steel Logan originally used was SAE 52100.

But the spindles were turned down and center-drilled from the solid to hole sizes as large as 1⅜". And ID's had to be accurate and free from scoring along the entire length of the spindles. 52100 provided the required mechanical properties but was slow cutting and created production difficulties and a high scrap rate.

Needed: A *free-machining* steel that would develop the high hardness levels, the toughness and wear strength required for the application.



THESE LARGE ALLOY STOCKS . . . also carbon and stainless steels in every shape and size, are in stock at Ryerson. Also call Ryerson for reinforcing steel service, industrial plastics, machinery and tools, etc.

THE SOLUTION—Logan engineers had long been on the lookout for a steel that would solve their production problems so they were eager to try New Rycut 50 when this Ryerson 50-carbon alloy steel with a controlled lead addition was suggested by Ryerson metallurgists.

New Rycut 50 was a success from the start! Now, after two years, Harry Peterson, Logan plant superintendent, reports: "New Rycut 50 has saved us a consistent 25% of our former costs in the production of lathe spindles. Rycut's uniform machining and hardening properties have reduced scrapped parts to a minimum and the steel has proved satisfactory in every way."

This is just one of many case histories in our files on the steels in the Rycut series—New Rycut 50, Rycut 40 and Rycut 20. Actual performance records show machinability increased as much as 50% . . . tool life lengthened as much as 300% when a Rycut steel is used in place of a standard alloy of comparable mechanical properties.

To get further information on these great new cost-cutting steels or for quick shipment of any steel requirement, call or write your nearby Ryerson plant.

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • WALLINGFORD, CONN. • PHILADELPHIA • CHARLOTTE • CINCINNATI CLEVELAND • DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

Metalworking Outlook

Making Plants Pay Off

The sales volume of Westinghouse Electric Corp. will rise 50 per cent in the next five years, while manufacturing facilities will be expanded only 2.5 per cent annually. How? "Through planning and management to improve existing plants and manufacturing operations rather than by building new facilities," explains John K. Hodnette, vice president and general manager of the company. Its expenditures for plant and improvement in 1957 will total about $75 million, but only some 20 per cent of this will be used for new plants. Most of the remainder will be spent for better utilization of existing floor space and for new equipment.

New Orders Edge Up

Keep your eye on the volume of new orders. Nationally, they're rising. Manufacturers' new business in May totaled $28 billion, up 2 per cent from April, on a seasonal basis. For durable goods, orders were up 6 per cent over April, with all major industries except primary metals sharing in the gain. New business for primary metals and nondurable goods was off a little from April's seasonally adjusted rate. Manufacturers' end-of-May inventories inched up to $52.0 billion, $4 billion higher than they were in May, 1956, largely because of inflation. Manufacturers' sales in May totaled $29.1 billion, about 5 per cent above May, 1956.

The Chicago Viewpoint

The Purchasing Agents Association of Chicago reports its members think this way about business prospects: Deliveries are generally satisfactory. Competition continues to restrain runaway price increases. Inventories are continuing to be reduced slightly. Employment is steady. Production is high, but at slightly lower levels than in past months. Order backlogs are stable. Profits are steady, but the squeeze continues.

Autos: 6.2 Million in '57?

Our auto industry may turn out 6.2 million cars in calendar 1957. Because their crystal ball has been a little cloudy lately, no industry executive is mentioning the figure too loudly in public, but that's the Detroit guesstimate at the moment. The total would rank 1957 third best for all time. Higher totals were assembled in 1955, with 7.9 million, and in 1950, with 6.7 million.

Car Imports To Double

Look for 200,000 foreign-made cars to be sold in the U.S. this year, double the 1956 volume. The total could reach 300,000 by 1958 as Ford and GM get into high gear with their programs to import models their subsidiaries make overseas. GM starts this fall to market its English-made Vauxhall Victor through Pontiac dealers and its German-produced Opel Rekord through Buick agencies. Ford has been marketing

the British Ford here since 1949, but this will be its record year, by far. The Volkswagen is the major import; watch for 90,000 to be sold in the U.S. in 1957.

More Executives Needed

Demand for executives, although easing slightly since February, continues strong, says Heidrick & Struggles in its latest Executrend survey. Each month, the Chicago executive recruiting firm analyzes the management positions display-advertised in the nation's ten most populated areas. Demand for general administration executives increased 18 per cent over that of the last six months of 1956. Positions available in aircraft and electronics engineering rose 11 per cent and marketing 13 per cent. Declines were registered in general engineering—off 9 per cent; in manufacturing—off 5 per cent; and personnel—off 14 per cent.

"A" Product Allotments Drop

Here are the allotments of metals to be set aside at the mill level for "A" products in the fourth quarter: 111,667,000 lb of aluminum (down 12 per cent from the third quarter); 44,849,000 lb of copper and copper base alloys (down 4 per cent); 546,620 net tons of steel (down 7 per cent); 7,961,000 lb of nickel alloys (down 16 per cent).

Russia Remains Behind

Concludes the Foreign Economic Policy Subcommittee of Congress' Joint Economic Committee: Soviet industry is about one-third the size of ours. Its composition is quite different, emphasizing heavy industry. "It's capable of turning out advanced machines and good equipment," says the report. Quantitywise, Russian industrial production from 1928 to 1955 was about equivalent to U.S. production from 1890 to 1920. Its 1950-1955 period compares best with our 1922-1927 boom. Transportation (rail, road and air) remains Russia's biggest problem.

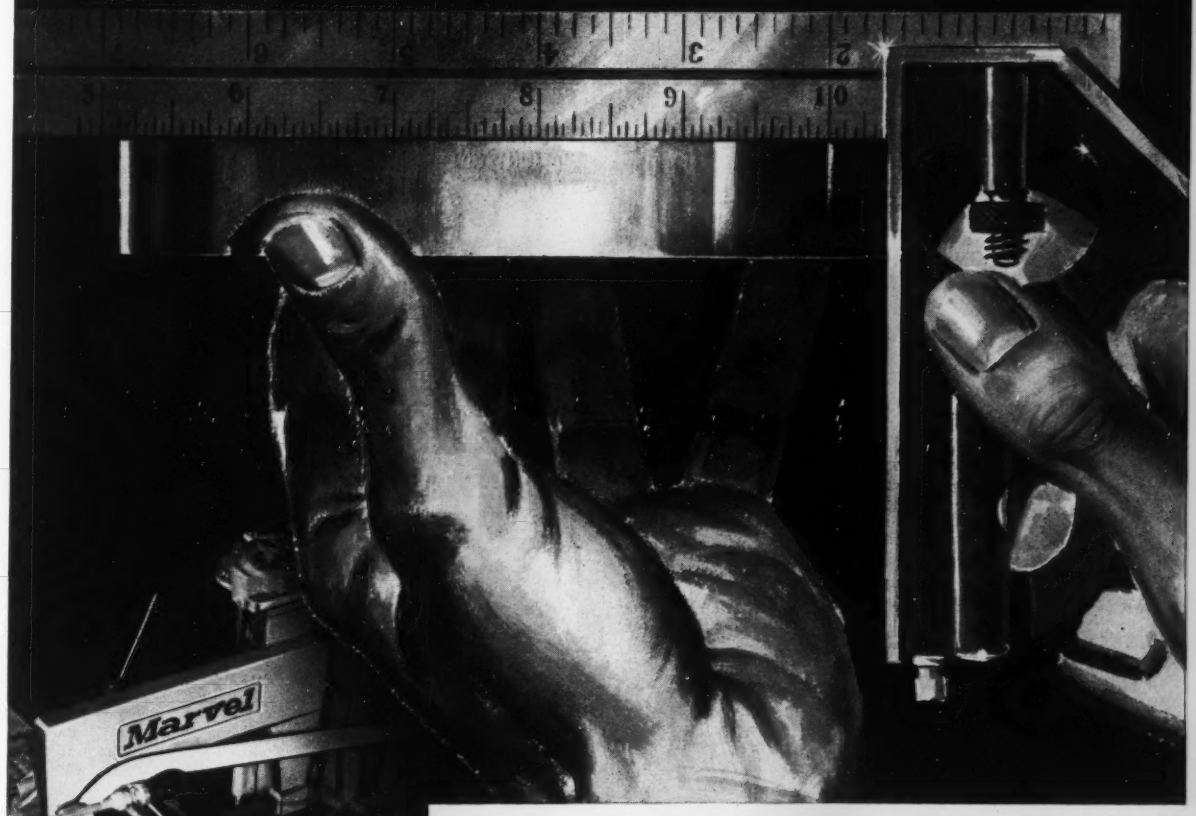
Big Ones Getting Bigger?

Sen. Estes Kefauver's (Dem., Tenn.) Antitrust & Monopoly subcommittee has received a report showing that in 1954 the 200 top manufacturers accounted for 37 per cent of the dollar value added by U.S. manufacturing. The top 200 accounted for 30 per cent in 1947. Also, from 1947 to 1954, the 50 largest manufacturers increased their percentage of value added from 17 per cent to 23 per cent. The report states that of 60 industries in the U.S. with shipments of a least $1 billion, 12 were dominated in 1954 (50 to 100 per cent of the market) by four corporations or less.

Straws in the Wind

The natural gas industry expects to spend a record $2.1 billion this year for transmission, distribution, production and storage facilities, reports the American Gas Association . . . The steel industry's estimated payroll for May was $338 million, compared with $331.5 million in April and $333.6 million in May, 1956, says American Iron & Steel Institute . . . During May, the industry's average hourly payroll cost for wage earners was $2.824, compared with $2.837 during April and $2.619 during May, 1956.

IN CUTTING-OFF OPERATIONS...



...SPEED WITHOUT ACCURACY IS COSTLY!

Efficient cut-off of steel blanks from bars demands a combination of speed *and accuracy*. MARVEL, and MARVEL alone, achieves this combination with machines capable of delivering feeds and speeds which fully utilize the strength and heat resistance of the modern high speed hack saw blade.

MARVEL dual power feed and crank lever method of reciprocation are two exclusive features designed to give increased speed and efficiency. This unique dual power feed employed on the Series No. 6 and No. 9 MARVEL Ball Bearing Hack Saw Machines, simultaneously controls both positive feed depth and feed pressure, automatically adjusting both pressure and depth of feed correctly in proportion to the number of teeth in contact with the work. This automatically forces the blade to cut as deeply as possible and practical on every stroke, without demanding the attention of the operator. As a result, the work is cut-off in the fewest possible number of strokes. Quick return of the saw frame on the non-cutting stroke, accomplished by the crank lever, delivers 33⅓% more cutting strokes per minute without increasing the blade velocity on the cutting stroke.

Accuracy is assured by the construction of the machine itself. Anti-friction ball or roller bearings are used at all load carrying points. The saw frame reciprocates on fully enclosed special design ball bearings which are factory adjusted with a pre-load, assuring permanent frictionless rigidity. Saw frame, saddle, and upright are precision machined and fitted to form a rigid integral unit capable of withstanding any cutting load with no deflection or side movement.

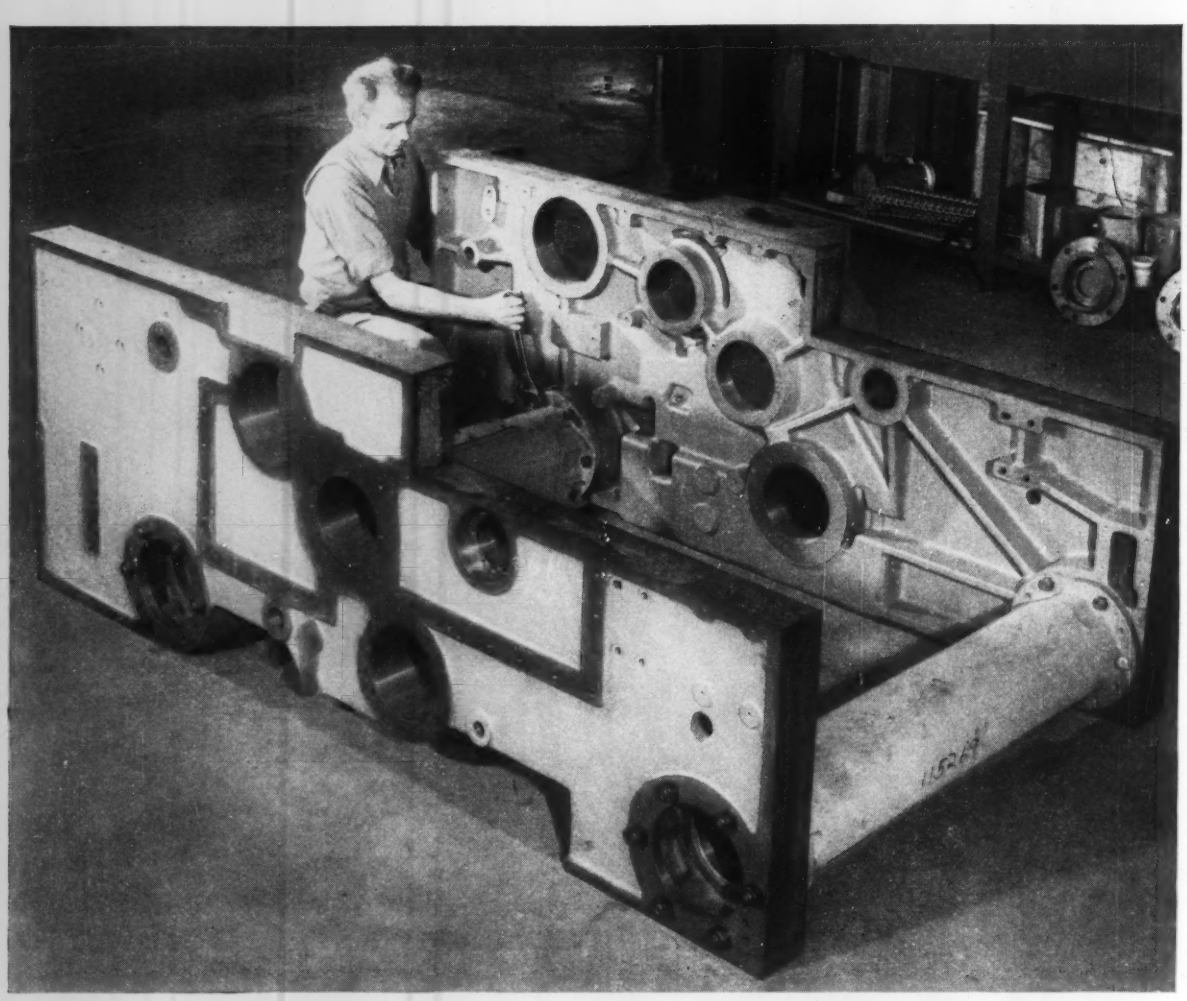
These exclusive features found only in MARVEL Hack Saw Machines, together with the unequalled performance of the unbreakable MARVEL High-Speed-Edge Hack Saw Blade, form a team that guarantees the fastest, most accurate cutting-off.

There is a MARVEL field engineer near you capable of intelligently discussing your cut-off work. Send for catalog C-55, and the name and address of your nearest MARVEL field engineer.

S-1300

ARMSTRONG-BLUM MFG. CO.
5700 WEST BLOOMINGDALE AVE. • CHICAGO 39, ILL.

Metal Cutting **MARVEL SAWS**
Better Machines-Better Blades



1300 pound cast frame for large high speed paper-making machine. Nickel added to cast iron eliminated deformations caused by internal stresses. Frame cast by L. Brayton Foundry Co., for St. Regis Paper Company, East Providence, R.I.

Deformation problem in heavy cast frames straightened out with 1.00% nickel cast iron

St. Regis Paper Company had a problem machining large cast frames for high speed multiwall paper-bag-making machines.

When frames were cast, differences in cooling rates between thick and thin sections caused wide variations in the "as cast" microstructure. And trouble began.

The base iron, adjusted to give dense, wear-resisting structures in heavily bossed areas, was chilling in ½" web sections. Result: internal stress, deformation during machining and serious misalignment in finished frames.

Heat treating? Not quite the answer. It would boost the cost of the casting 25%. There was another way. An easier way. A sure way.

1.00% nickel addition solves deformation problem.

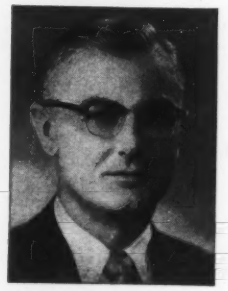
St. Regis engineers working with the foundry decided on a 1.00% nickel addition to the base iron. It solved the problem. The nickel brought about uniformity of microstructure. It reduced chill and eliminated the stresses resulting from it.

This increased stability paid off in another way: it saved valuable production time. With nickel cast iron, machining operations keep right on going – without interruptions for stress relief or danger of hard edges. The nickel also makes the frame easier to machine to the tolerances required.

Do you have a metal problem? Let's talk it over. In the meantime, a booklet, "Nickel Alloyed Cast Irons" may give you a clue to the solution. Just write.

INCO TRADE MARK

THE INTERNATIONAL NICKEL COMPANY, INC. 67 Wall Street New York 5, N.Y.



Parable of the Prices

And it came to pass in the year of our Lord, nineteen hundred and fifty seven, that there was plenty in the land.

Yet with all this plenty, there were some who were sorely troubled.

And a soothsayer came among them, and they cried out unto him their woes:

We payeth more in wages to our labourers.

We payeth more for materials to our suppliers.

Our profit shrinketh.

Competition in the marketplace is keen, and we fear to raise our prices so as to recover our costs.

And now there cometh from Washington a politician, and he panteth after political hay as the hart panteth after the water brooks. And he uttereth loud noises against price increases.

Verily, what are we to do?

And the soothsayer spake unto them, and he talketh turkey:

Ye are beset by fears. I say unto you, fear not.

The need and the want for thy goods are great. Ye can sell plenty. Thy profits shalt not perish. For without earnings thou canst not provide the goods thy neighbors need. Thou canst not bring new products into the marketplace. Thou canst not grow and flourish.

Now I say unto you, first make thy costs competitive. Thy knowledge and thy skill, thy tools and thine inventiveness, they will help you.

And then I say unto you, when ye goeth into the marketplace, sell not first with price. Sell first with quality and service and engineering. Thy competitor, let him worry about prices.

For it is written in the book that few buyers are lost because of prices. It is written also that lack of diligence among vendors and unadjusted grievances do cause the loss of customers far more than doth price. And this is true ten times over.

It is written that the seller shall set the price for his goods. And this is an old law and a good law.

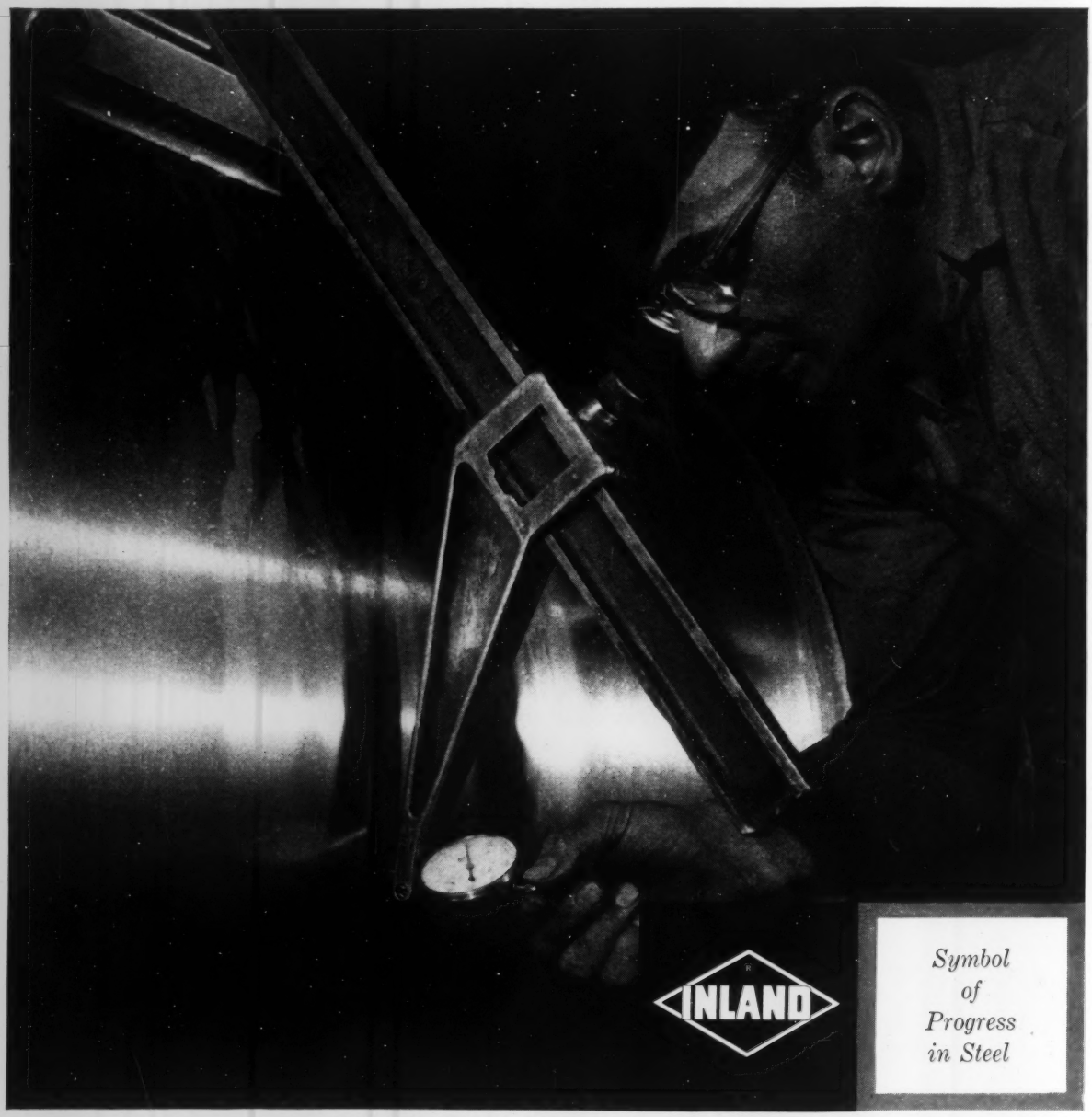
So I say unto you, go ye forth and set prices that will return ye a profit that is fair but not exorbitant. And go forth and worketh to beat hell. And ye shall rejoice in your plenty, and thy neighbors shall rejoice with you.

Walter J. Campbell

EDITOR

Hair's Breadth

Precision grinding of the rolls for the mills that process your steel is one of the key steps in maintaining product uniformity at Inland. But almost everywhere you look in the steel plants you'll see people measuring, testing, comparing, or in some way checking steel or steelmaking equipment . . . guarding the standards of uniform performance. In fact, we are constantly focusing on improving product uniformity through every phase of steel manufacture, from raw materials to finished product. This *extra* care means that the steel you get from Inland will give you the same dependable performance, time after time after time.

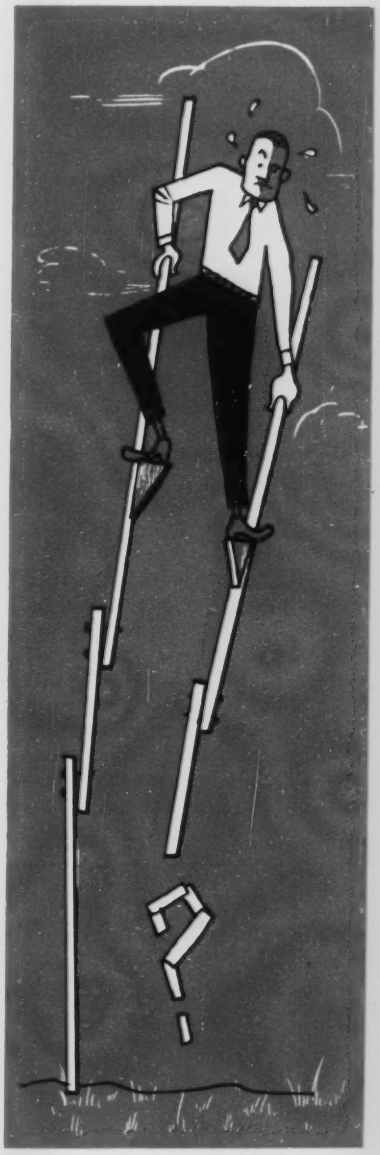


INLAND STEEL COMPANY • 38 South Dearborn Street • Chicago 3, Illinois

Sales Offices: Chicago • Milwaukee • St. Paul • Davenport • St. Louis • Kansas City • Indianapolis • Detroit • New York

How Much Price Patching by Steel Consumers?

Some will pass along increased material and wage costs. Others will wait to see what competitors do. Still others will try to absorb all or part of higher costs



METALWORKING pricing reaction to midyear steel and wage increases will be mixed.

- Some will pass it along in the form of an average price hike of about 7 per cent. (The steel increase averaged 4 per cent. See STEEL, July 8, p. 53.)
- Others will absorb part of the increased costs because of competitive conditions.
- A few will absorb all of them.
- Many will await action by competitors.

They'll Go Ahead

"I can't think of a single reason why we should not pass on all the steel price increase," says the sales manager of a Cleveland producer of nuts and bolts.

Bill Strain, sales manager and co-owner, Kean Mfg. Co., Dearborn, Mich., nutmakers for auto companies, says: "I'm sure we'll be raising prices, and I'm sure we'll be passing along all the increase. We don't know just when. It will depend upon what the rest (of our competitors) do."

Cars To Go Up—In Detroit, most producers feel that prices will have to be increased, but some are holding off because of slow sales, competition and upcoming improvement factors. The general feeling is that all the increase will be added, which, with the cost of living and improvement factors, will add $30 to $60 to the price of 1958 cars.

In Chicago, P. K. McCullough, vice president, Mercury Mfg. Co., producer of electric trucks, gas tractors and trailers, said a 7 to 8 per cent price rise in May "reflected partial catching up and partial anticipatory increases. We had a wage increase last September, plus material and component increases for which we had not adjusted. Gas tractors and trailers will have to go up. It looks like about 5 per cent."

Fasteners Go Up—W. T. Ylvisaker, vice president, Pheoll Mfg. Co., Chicago, says: "We increased prices on our fasteners an average of 4 per cent. We've been able to hold the line on some of our volume items because of increased productivity."

Pettibone Mulliken Corp., Chicago, producers of railroad track, switches, frogs and steel alloy items, has increased railroad items about 7.5 per cent, according to Wade Meloan, vice president, who adds:

"This is partially due to the steel increase and also to last year's hike, which we had not recovered. We're currently negotiating a wage contract, and any increase here must be reflected. Competition is another factor. When you're not the leader, you can't make a bigger increase than he and make it stick."

More Advances—General Electric Co., Schenectady, N. Y., announced increases of 4.5 per cent on repair prices of most electrical products. Prices on transformer products are up 4 per cent; switchgear products are up 7 per cent.

Elmer Gustafson, vice president, Ceco Steel Products Co., Chicago, says: "We've increased prices where possible to pass it along. The competitive factor has to be reckoned with, and we'll have to feel our way. On our commodity lines (metal window frames) the increase

is about 6 per cent. On steel joists, roof deck, etc., about 5 per cent."

They'll Wait 'n' See

G. H. Whitehouse, vice president, Snyder Tool & Engineering Co., Detroit, maker of special machine tools for the auto industry, says: "So far we haven't put the price increase into effect. We need more, but we're having trouble getting orders now. We'll pass it along eventually, when business gets better."

Says Perry Williams, president, Kelsey-Hayes Co., Detroit (auto wheels and aircraft components): "In this industry there are no fixed prices. We'll be passing along all the increase as soon as we can. How else can you make a profit?"

Competition Is Key—E. M. Bimberg, general manager, Zenith Carburetor Division, Bendix Aviation Corp., Detroit, says: "We don't know yet what we will do about prices. Competition is always a factor. We have an improvement factor coming up Sept. 6, so we'll need some kind of a package then, but it won't be across the board."

In Pittsburgh, a spokesman for Westinghouse Electric Corp., says: "We haven't seen a complete breakdown on the increases in price of basic steel and the fabricated products which we buy, so we don't know just how we will be affected. We estimate the steel increase will add about $2.5 million to our costs."

Out of New York comes word that metalworking companies are eliminating all overtime in an effort to keep costs down and pushing incentive systems to increase productivity. Most will pass on all or part of the steel price advance.

A sales manager for Manion Steel Barrel Co., Rouseville, Pa., says: "Prices will have to be increased, but we don't know yet how much."

The same attitude is expressed by Morris Calig, president, Calig Steel Drum Co., Pittsburgh; a sales manager for the chain division, McKay Co., Pittsburgh; and H. N. Campbell, sales manager, McKinney Co., Pittsburgh hinge producer.

Customer Factor — "Customers are resisting any more price increases, although we are hit by higher raw material and labor costs," says J. L. Henderson Jr., general manager, Robinson Ventilating Co., Zelienople, Pa.

"I would say that to take care of the steel price hike, and our increase in labor costs, we will have to get a minimum of 7.5 per cent increase in our prices. But this will be hard to get," he concludes.

"We can't absorb any more increase," says a sales manager for Pittsburgh Auto Spring Co. "Taxes are rising, and while we do not want to take unfair advantage of the chance to raise prices, we have to operate at a profit."

Deere & Co., Moline, Ill., farm equipment manufacturer, said through a spokesman that it is "reluctant to increase prices in the aftermath of the recent steel price boost, but with costs increasing it seems inevitable that sooner or later some price adjustments will have to be made."

They'll Stand Pat

William J. Farrell, chief applications engineer, Sciaky Bros. Inc., Chicago (resistance welders and accessories), sounds this note: "We have no plans for a price increase. Our last increase, 15 months ago, was our first in several years. We plan to hold the line now by sharpening our methods." Other firms will do the same.

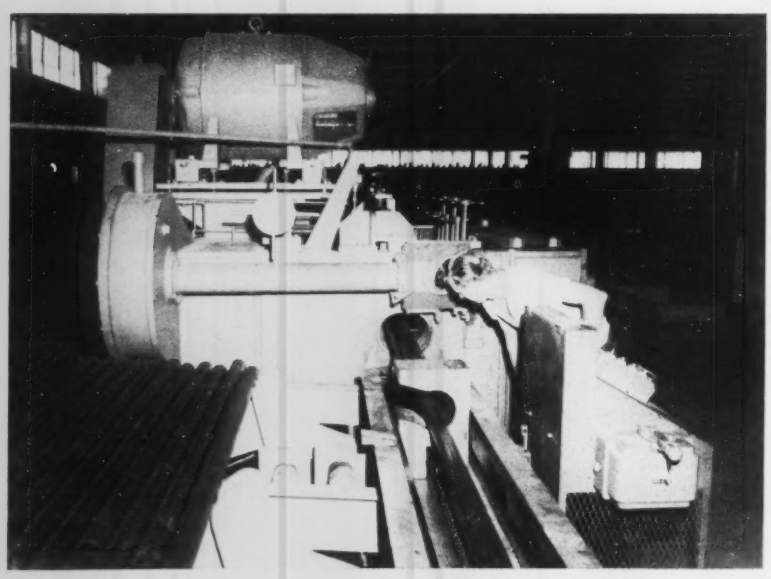
A Dissent

"Frankly, I'm disappointed in the big companies," comments the vice president of a Chicago component manufacturer. "Just out of concern for the whole economy you would think they would heed the plea of President Eisenhower. Arguing who is to blame, the unions or corporations, won't settle a thing. What's needed is for someone to make the first move. This was the steel industry's big opportunity. Their profits look good to me. Any government investigation will have my blessing."

Background

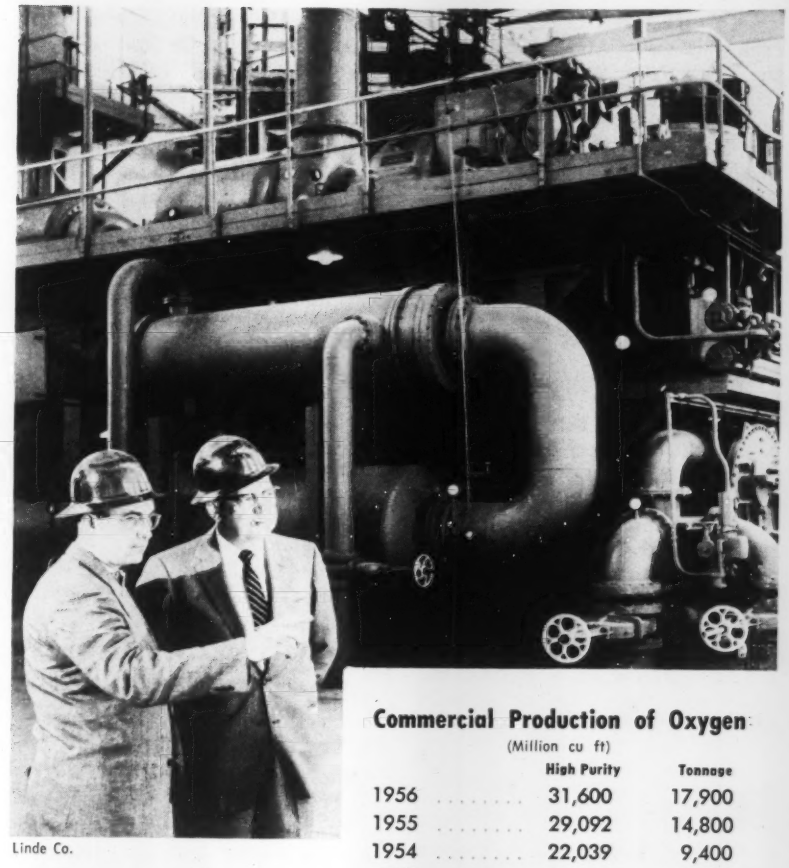
Last summer, the base price of steel rose an average of $8.50 a ton, which the industry said was inadequate. This sent the Bureau of Labor Statistics' finished steel price index up 10 points. In December, price extras pushed the index up another 6 points. The current steel base increase (averaging $6 a ton) will raise the BLS index 7 points.

This is the sixth consecutive year of steel price increases, each one following a wage increase to steelworkers.



Jones & Laughlin Opens Cold Finished Steel Bar Mill

Production of cold finished steel bars has started at the Willimantic, Conn., division of Jones & Laughlin Steel Corp. The plant is one of few in the U.S. to use Schumag continuous cold drawing machines. They draw, straighten, polish and cut to length in one operation



Linde Co.

Commercial Production of Oxygen

(Million cu ft)

	High Purity	Tonnage
1956	31,600	17,900
1955	29,092	14,800
1954	22,039	9,400
1953	25,300	13,000

Based on government sources.

Industry Uses More Oxygen

Record is likely this year. Spectacular increase in consumption comes mainly from metallurgical requirements. Expansion of capacity expected to be continued

INDUSTRIAL consumption of oxygen may level off some, but chances for a record year are good.

1. STEEL's midyear survey verifies predictions of a new high for the metalworking industry as a whole.

2. The outlook for record steel production is promising. (More than 68 per cent of oxygen production goes into steelmaking and metal fabricating—including the booming shipbuilding program. The ratio of oxygen consumption to operations is continually increasing.)

3. Chemical requirements, normally taking 23 to 24 per cent of the oxygen produced, are running ahead of last year's.

Only the Beginning—Plans are being laid for still bigger years. High purity oxygen capacity, currently estimated at 32 billion cu ft, is scheduled to be stepped up 3 billion within the next year or year and a half, and there is talk of still more—perhaps another 3 billion—within the following two to three years.

Bolstered considerably by on-the-spot generating plants, tonnage oxygen capacity also is being expanded to meet growing demands for metallurgical requirements and certain basic chemical needs.

The metallurgical, or "cooking" requirements, have accounted primarily for the spectacular increase in oxygen consumption by the steel industry during the last three or four years. These needs are still growing at an accelerated pace.

Business Analysis — A spokesman for Linde Co., a division of Union Carbide Corp., New York, says: "Oxygen usage is continually increasing in the longer lived areas, such as scarfing, cutting and scrap preparation, but this increase is at a slower pace than that in the metallurgical field. A year ago we had estimated that about 40 per cent of the steel mill oxygen use was metallurgical. At present, this is probably closer to 50 per cent and may soon go into the lead —a lead not likely to be lost."

The present increase in metallurgical applications is mostly in the open-hearth furnaces for decarburization. Some oxygen is being used for end-burner flame enrichment. Other uses are developing. An increasing, though still modest, amount is going into the oxygen converter process. Experimentation is going on with other such processes as H-iron, Kal-do and Cyclo steel. The oxygen lance for the open hearth is under study. All hold promise of greater use.

Some oxygen is used for enrichment of bessemer blast to increase the percentage of scrap per charge. At least one large steel company, Weirton, uses oxygen in its blast furnaces as standard practice, to reduce the coke rate. But there is still some debate in the steel industry on the value of oxygen enrichment for basic pig iron production.

U.S. Steel Corp.'s Duquesne (Pa.) Works has recently started using oxygen in its ferromanganese blast furnaces. Such units consume about 2.5 times as much coke per ton of metal as pig iron furnaces; reduction in the coke rate is especially important.

Close to 200 cu ft of oxygen is being consumed per ton of ingots, compared with 175 in 1955, 105 in 1945 and 38 in 1935.

The chemical industry is expanding its use of tonnage oxygen in synthesis gas manufacture and

other basic processes. Liquid high purity oxygen is used extensively for rocket and missile propulsion—the only significant end use for the liquid form.

Distribution Note — The trend toward the distribution of oxygen as a liquid is increasing. (Some say about three-fourths is shipped this way.) Two side effects: Liquid oxygen is about seven times more concentrated than the gaseous form. So users retain cylinders and trailers longer than they do when they use the gaseous product, but the investment in shipping containers per unit of volume moved is lower. One large producer declares that about 40 per cent of his production this year will be in liquid form, compared with 33 per cent last year.

Supply Note—The missile program is taking a lot of liquid oxygen, but it is believed that still heavier wartime demands could be met because of continuous expansion at government controlled plants. Another point: Requirements per missile would be lower in wartime because emphasis would be on firing rather than testing—it takes about two-thirds less oxygen to fire a missile than test it.

Although government requirements for liquid oxygen from commercial producers may not have reached their peak, they are easing at present. A Linde spokesman says that his company's shipments to the government are on the downgrade, due primarily to the increase in government controlled capacity.

Progress Lowers Price—Because of improvements in production designs and techniques and increased demand, prices have been undergoing a steady reduction. Today, one leading producer says, the price of bulk oxygen is less than 25 per cent of what it was 30 years ago, "without any correction for devaluation of the dollar and in spite of rising costs for other materials and services."

Large efficient on-site oxygen producing plants, he points out, have made even further price reductions possible because of the elimination of transportation expense. But such facilities are not feasible until the consumer's requirements call for a large capacity unit.

Big Suppliers—Linde is by far the largest producer. Other leaders rank this way: Air Reduction Co. Inc., New York; National Cylinder Gas Co., Chicago; Liquid Carbonic Corp., Chicago; and Air Products Inc., Allentown, Pa. Linde and Air Products are the largest manufacturers of oxygen generating equipment in the U.S. Air Products says its over-all sales this year will substantially exceed last year's volume ($20 million).

The trend toward more on-site stations continues. Some oxygen producers either lease or sell these units outright. At least one large producer retains full title to all equipment. He operates the unit, maintains it and stands responsible for meeting the consumer's requirements by supplementing the supply from a central producing station. Others who lease offer similar protection.

Some firms are holding largely to conventional methods of distribution, building more central stations and increasing the capacity of existing units.

Republic Replaces Coke Ovens

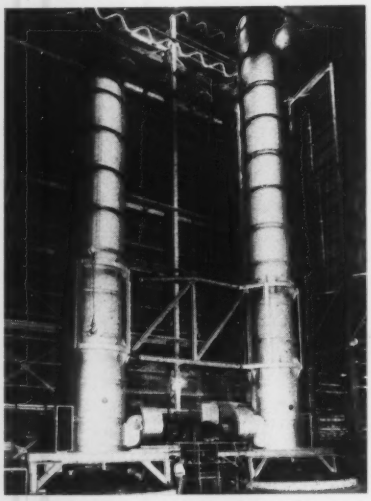
Republic Steel Corp. will spend $14 million to replace two batteries of coke ovens at its Cleveland plant.

Installation of 102 ovens of Koppers design will boost capacity about 20 per cent, M. E. Goetz, district manager, said. Each battery will be more than 200 ft long, over 26 ft high and 37 ft deep; each oven will be 12.5 ft high and 37 ft deep, with an average width of 17 in.

A mechanical charging car will replace a gravity car. This will reduce charging time from more than two minutes to less than one minute.

Four centrifugal, multiple stage gas boosters will be installed, coke handling facilities will be improved and screening equipment will be added.

Construction of a third battery replacement, under way for the past year, will be completed in August.



Ten-Story Tall Furnace

This 110-ft electric furnace, built by Westinghouse Electric Corp., heat-treats aluminum alloy shapes for Harvey Aluminum Sales Inc., Torrance, Calif.

Makes New Fuel

Olin Mathieson Chemical Corp. is counting on it to create $1-billion industry

Olin Mathieson Chemical Corp., New York, is producing high-energy aircraft fuel on a semicommercial basis at its Niagara Falls, N.Y., plant.

All shipments are being made to the Air Force now, but the company expects it to be used for long-range civilian flights in the near future.

Dr. L. K. Herndon, vice president, Research & Engineering Division, claims the fuel has four advantages over present commercial types:

1. It does away with engine failure problems at high altitudes. 2. It increases the range of aircraft about 40 per cent. 3. It eliminates the danger of jet engine flame-out. 4. Where range is not the consideration, less fuel for a given distance increases payload; or with a conventional payload, it gives greater speed.

The boron-base fuel will be produced by other companies, said Dr. Herndon.

A Model City, N.Y., plant, still under construction, will employ 800 initially.

An investment banking house sums up the outlook: "Assuming

a conservative price of $1 a gallon for the fuel, its consumption by the military at last year's jet fuel rate, would create a $1-billion business."

Chicago Continues To Build

Industrial development projects announced for the Chicago metropolitan area during June came to $13,136,000, says the Chicago Association of Commerce & Industry. The projects include new and expanded industrial buildings and acquisitions of land or buildings for industrial purposes. In June, 1956, industrial developments totaled $26,494,000. In the first half of this year, 156 projects worth $100,-305,000 were announced. In first six months of 1956, there were 190 projects totaling $381,814,000.

The dollar volume for the first half is greater than that of similar periods in seven postwar years. It was exceeded only in 1951, 1954, 1955 and 1956. The last two record-breaking years (1955 and 1956) have seen some enormous projects started, some of which will not be completed until 1958 or 1959.

Spang-Chalfant Ups Capacity

Production capacity at National Supply Co.'s Spang-Chalfant Division plant in Ambridge, Pa., is being increased 5 per cent without an accompanying increase in manufacturing space.

Steps taken since 1955 to expand output of oil country tubular products: Replacement of conventional machinery with highly automated equipment; substitution of more durable machines for those which required excessive maintenance and down time; installation of more efficient inspection and testing equipment; improvement of material handling, storage and housekeeping methods.

Western Electric Builds Plant

Western Electric Co. broke ground at Columbus, O., for a $50-million plant. Scheduled for partial occupancy by 1959, it will employ 4000 in the manufacture of dial switching equipment for the Bell Telephone System.

National Screw Machine Products Association tells how to . . .

Stop Costly Extras

Puzzled by wide variance in price quotations? Screw machine product makers (after 11 regional clinics) come up with ways to standardize estimates

- ☑ **END USE** . . . If the manufacturer knows what the part is supposed to do, he may be able to give you an easier or less costly method.
- ☑ **BLUEPRINTS** . . . Inaccurate prints cause incorrect estimates and costly delays. Make them clear and complete.
- ☑ **QUANTITY** . . . Because many costs are fixed, parts are "cheaper by the dozen." Order for your long range needs.
- ☑ **MATERIAL** . . . Choose the most-easily-machinable material which can do the job. Poor machinability shortens tool life, causes down time, boosts costs.
- ☑ **TOLERANCES** . . . Don't make specifications closer than necessary. It takes additional supervision, expensive tooling and frequent tool adjustment to hold fine tolerances.
- ☑ **FINISHES** . . . If the part doesn't move or require a close fit and isn't seen, there's no need for shaving, grinding or burnishing.
- ☑ **GAGES** . . . Unless you tell the supplier that he'll get gages with the order, they'll become a costly part of his estimate.
- ☑ **SECOND OPERATIONS** . . . Maybe the part can be redesigned so that only one operation is needed.
- ☑ **THREADS** . . . Specify American National or Unified threads. Special threads require special tools, thread gages, more inspection.
- ☑ **HOLE DIAMETERS** . . . Avoid, if possible, hole diameters that can't be made with standard drills.

Annual jobholders' meeting helps Pitney-Bowes Inc. to . . .

Keep Employees Informed

EACH YEAR employees at Pitney-Bowes Inc., Stamford, Conn., submit about 1000 ideas on how the firm can save time and cut costs. About one out of every four workers makes at least one contribution.

Such participation is the direct result of a ten-year-old, two-way program of communications. Every worker can be as cognizant of planning, sales production, profits and methods as top management. Many are.

By concentrating on good employee communications, Pitney-Bowes utilizes the program as the basis for better relations with customers, suppliers and the public. If you want to know how things are going at Pitney-Bowes, ask the man or woman at the bench, sales or service desk.

Realistic Plan—There is nothing sensational about the program. All accepted practices of good public relations are included, plus some common sense factors. The firm holds annual jobholders' meetings—a counterpart of those for stockholders. Of increasing importance is the Council of Personnel Relations, the main policy group. Six of its 13 members are elected by employees.

Other facets include a monthly management newsletter, the president's quarterly letter to employees (it's sent to their homes), spot news and information publications and the bimonthly illustrated *P-B Bulletin*. Publications going to workers are in their language.

Promotes Understanding — The program plays a big part in employee attitudes: 96 per cent think management is doing a good job; 91 per cent say the company is better than most as a place to work; 90 per cent declare they are well informed about company affairs; and 85 per cent consider themselves "a part of the team all the time."

Promotes Profits — Tangible results are difficult to trace to the program, but in ten years it has contributed substantially to: Productivity (up over 40 per cent); profits (nearly doubled); dividends (more than doubled); and average income of employees (up from $2720 to $4720).

Employee Is Key—Says Frederick Bowes Jr., vice president, public relations: "A company's public relations program depends for its success upon the behavior of well-informed, well-adjusted employees, who, by their words and attitudes, convey more about the company than anything it can do or say by itself. There are two major phases of public relations, customer and community."

The need for emphasis on employee communications is greatest of all in community relations, believes Mr. Bowes; like charity, public relations begins at home. What a machinist tells his pastor about Pitney-Bowes has far more of a "public relations" message in it than anything the company can present.

Mr. Bowes stresses these basic principles:

Point No. 1: Unless top management is deeply interested and involved, forget the whole thing; President Walter H. Wheeler Jr. is the mainspring of the program; he's closely supported by personnel and public relations directors. They keep communication lines open. For all practical purposes, an employee communication is a community message.

Point No. 2: Come clean when you talk and write; never cover up, overstate or undersell. Give the bitter with the sweet. Discuss intimate, even controversial facts and figures, if understanding is improved; executives' salaries, including the president's, are given at jobholders' annual meetings.

Point No. 3: When top management has important company news, let foremen and first-line management know about it first; be sure employees get the news before the community does. The

employee wants the facts first from the company, at the plant, and not at the supper table, club or bowling alley; advance copies of memorandums and bulletin board notices, plus monthly newsletter cover this.

Point No. 4: Don't talk unless there is something important to say. Think in terms of subject matter and message rather than communications as such. Areas include sales, gains and losses, profits and profit margins, the new plant addition, where the money is coming from, that antitrust investigation, new and interesting uses for the product, competition. Men can't carry generalizations about free enterprise back to the community every night; they can impart something factual and interesting about that one unit of free enterprise they know best.

Point No. 5: Put more emphasis on face-to-face mediums than the printed word. Too many companies reverse this, spending up to 90 per cent of appropriations on booklets, magazines, brochures. All are important but take second place in P-B's program; their greatest value may be that they round out and confirm what has been communicated more directly.

Point No. 6: A good profit sharing plan helps, but is not mandatory. It is not only a communications spark that can bridge the gap of economic understanding between labor and capital, but it can be an appealing asset in any company's public relations.

Point No. 7: Top management's task is to stimulate communications, not merely to provide the channels; it isn't enough to provide the good and right answers to obvious and expected questions; employees must know their management genuinely wants their questions about the business. This can't be achieved by a passive "my door is always open policy"; this makes listening fully as important as talking and writing.

More Rewards—Pitney-Bowes, a major producer of postage meter equipment, will do a volume of close to $46 million this year, compared with $43.5 million in 1956 and $39.3 million in 1955. The company is diversifying into electromechanical handling of mail and paper work.

A $6-million building program providing 260,000 sq ft of manufacturing and office space will be completed in 1958. Engineering and research expenditures this year will approach 3 per cent of the company's gross income.

Postage meters now account for an estimated 48 per cent of all U.S. postage revenue, having passed the $1-billion mark for the first time last year.

Fights Fire with Education

Republic Steel Corp. shows its 70 fire marshals latest equipment and techniques used to prevent blazes and extinguish them. Clinic will be repeated

REPUBLIC STEEL launched a corporation-wide fire prevention program with a clinic at Warren, O. In attendance were 70 fire marshals and other safety personnel from 43 steel plant districts and seven mining districts.

R. H. Ferguson, assistant director of industrial relations at Republic's home office in Cleveland, says plans are to hold similar clinics at least twice a year.

"The response was enthusiastic," he said. "Republic has an excellent fire prevention record, and we intend to maintain it."

Rising Hazard — The National Board of Fire Underwriters estimates that fire loss in the U.S. increased 12 per cent in 1956 over 1955. The first two months of 1957, says the board, showed a loss from fire of $210.8 million, an increase of 16 per cent over that of the same period last year.

Recognition of the mounting fire loss led Republic to build a training area to simulate plant and mine conditions and to demonstrate 15 types of fires. Experts using the latest fire fighting equipment put out the blazes.

The corporation has several hundred men in its fire brigades. Those receiving the clinic training, for which they were given a certificate, will train units in their home plants.

Demonstration fire at Republic's Warren, O., training area

The Kefauver Probe: Where Will It Lead?

A GRIM Sen. Estes Kefauver (Dem., Tenn.) is out to get "big business." The charge: "Administered" prices are hamstringing the economy. How can prices go up in the face of declining demand and excess capacity? asks the senator. He is looking straight at the steel, oil and auto industries.

His ammunition: 1. A study on "Productivity, Prices and Incomes" prepared by the Joint Committee on the Economic Report. 2. A study on concentration in industry prepared by his own Antitrust & Monopoly committee. 3. Witnesses from the steel, oil and auto industries and private economists.

To Wages as Well as Prices

There's a possibility, though, that the senator's well laid plans may backfire. Following his opening statement at the subcommittee's hearing last week, which concluded that "conscious and deliberate action of corporate managers . . . set prices at alternative levels," Senator Kefauver's first witness, Edwin G. Nourse, vice president, Brookings Institution, failed to back him up.

Mr. Nourse claims administered prices are an "inevitable" and "natural" outgrowth of our economic system; indeed, the steel and auto industries couldn't function without them.

The economist, former chairman, Council of Economic Advisers, under President Truman, went even further: He widened the definition of administered prices to include administered wages . . . the price paid for labor. Mr. Nourse put "big unions" on the same level as "big business" and pointed out that both had equal responsibility for holding the line against inflation.

To the Obvious Conclusion

The subcommittee has plenty of competition from Sen. Harry Byrd's (Dem., Va.) finance committee which is still hearing testimony from Treasury department officials on monetary policy, and the joint economic committee's recent work.

It is unlikely that anything new will come out of these hearings, although some Democrats will do their best to capitalize on them for electioneering purposes. Behind any Democratic talk will still stand, however, Mr. Nourse's condemnation of labor's position.

The committee will be forced to come to the obvious conclusion: Restraints are needed, but they should be private restraints on the part of labor and business, not government controls.

But with One Question Unanswered

In debate, when all the shouting is over, will remain the big question: How do you get labor and business to restrain their desires for higher wages and higher profits, when wage hikes and price hikes continue their present leapfrogging? Within Mr. Nourse's testimony may be a hint of the answer: Public pressure seems to have held the steel price hike to $6 a ton instead of the $12 some wanted; public pressure might hold off Walter Reuther's demand for a four-day week with five days'-plus pay.

An official of the Labor department recently offered the thought that something of a buyer's strike is already in the wind.

Mr. Nourse believes that the continued rise of the stock market represents buying against future inflation prospects. Washington circles are least optimistic in months about the outlook for 1958, despite the healthy year we are now having. That's something to mull over: In the last few years, signs of discouragement have usually first come from business managers, not government officials.

Unions Wake Up to Disarmament

Industry, especially small firms heavily dependent upon defense business, might take a page out of the International Association of Machinists' book. The IAM's recent Denver conference on the aircraft and missile industry set up these goals:

1. Company-wide, union shop agreements. 2. Special contract provisions for skilled workers and salaried technical persons, including percentage wage increases. 3. Revision of the entire industry's wage structure. 4. Extended apprentice programs.

Aircraft Strike in 1958?

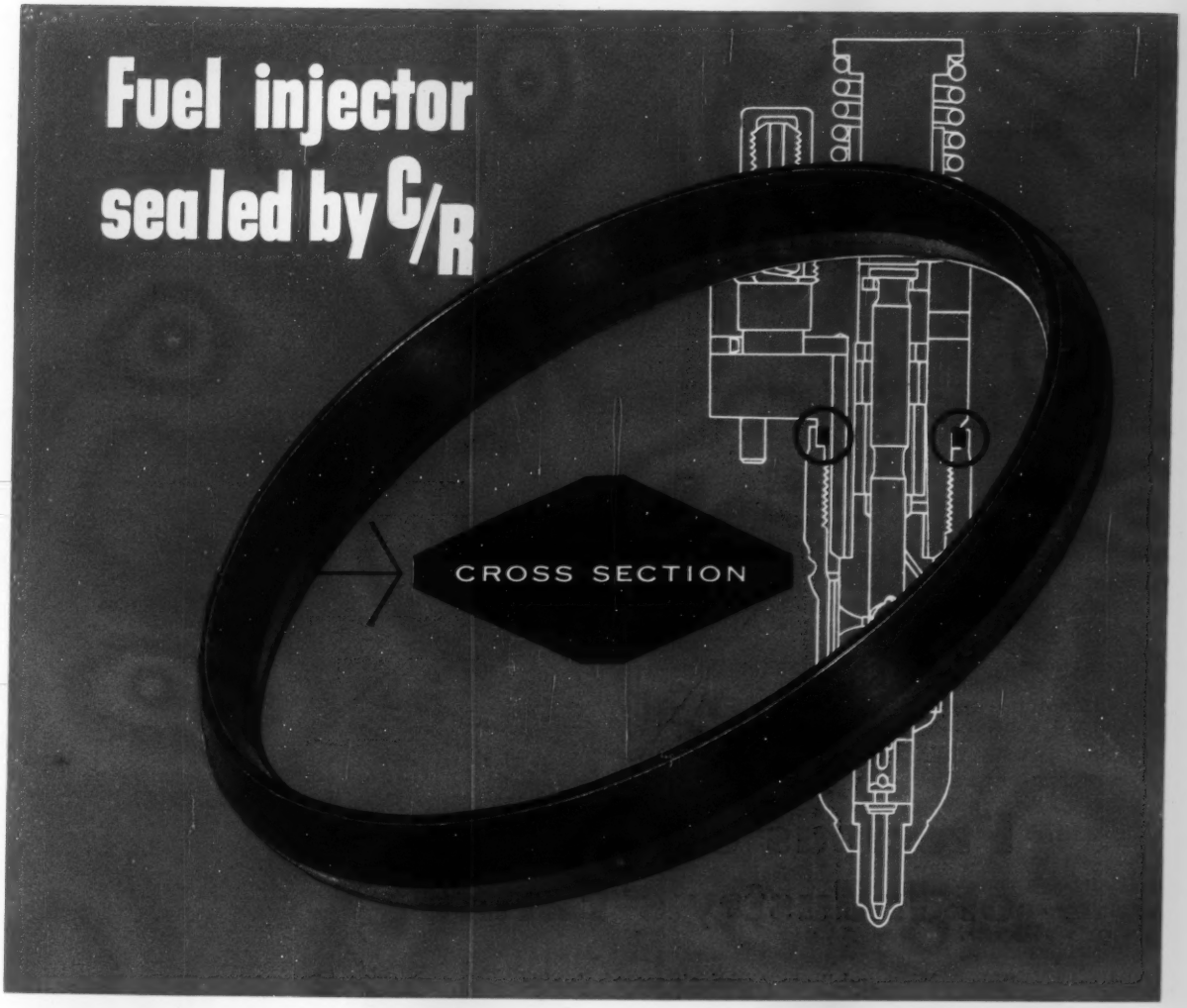
With all major union agreements in the industry (except United Aircraft Co.) expiring next spring, and the aircraft slowdown (STEEL, July 1, p. 38), the chances of a major strike in 1958 are not remote. Negotiations with United Aircraft this fall will forecast events to come.

The IAM claims overtime cutbacks are costing its members $17 to $36 a week. It is also ready to take on the Defense department for its part in regulating industry wages by judging the "reasonableness" of all union contracts.

Peace Between Trades and Industrials

The AFL-CIO executive council has approved an agreement between its building trades unions and industrials on jurisdictional disputes: 1. Building trades will handle new construction. 2. Production and running maintenance will be the job of the industrial unions. 3. Previous practice will govern in alterations, major repairs and relocations.

A six-man team will spot check any disputes and arbitrate between the building trades and industrial unions. Appeals can be made to the executive council.



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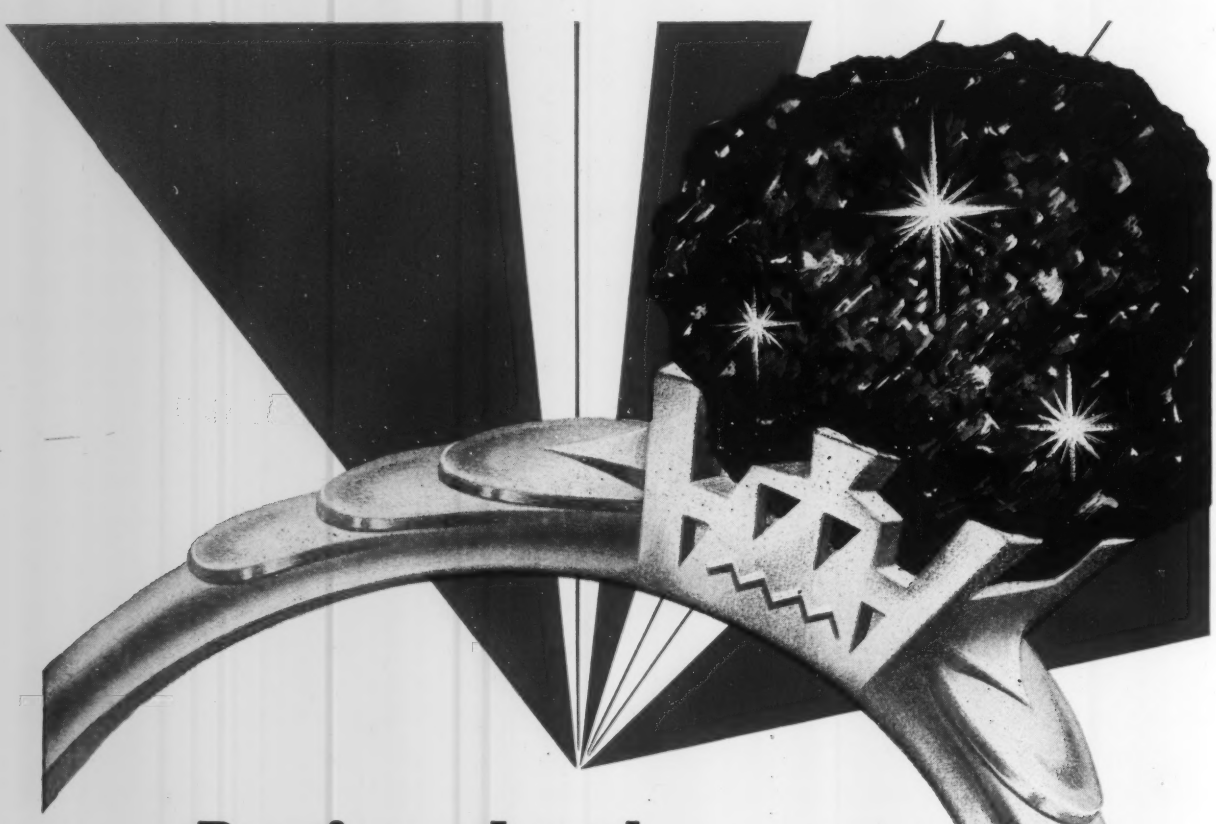

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C. & O. Railway Co.

Buffalo R.R. Plants Busy

Six area suppliers of rails, castings and accessory equipment report production, orders ahead of 1956 pace. No letdown since December, 1955, says one

MANUFACTURERS of railroad equipment in the Buffalo area are having one of the best years in their history because of the modernization and improvement programs of the nation's railroads.

Six companies in the area say there has been a moderate upturn in orders for track and maintenance hardware, replacement brake shoes and rails so far this year. Steel castings for cars and locomotives and other heavy equipment appear to be holding steady at last year's healthy levels.

American Brake Shoe—"We're having the best year since we started here in 1949," says George L. Rieger, superintendent of the Vulcan street plant. Order backlog is three months, and sales of switches, switch stands, crossings, studs and other standard track equipment are running "considerably ahead of last year's pace." American Brake Shoe's Bailey avenue plant is turning out 80,000 cast iron brake shoes a month, which compares with a rate of about 65,000 a month in 1956. June orders for new-car brake shoes are down from 18,000 in 1956 to 12,000 this year, but replacement shoes are more than making up for it, says John P. Mycek, plant superintendent.

When the industry felt a slight letdown last fall, the Bailey avenue plant was working alternate four and five-day weeks. Since Jan. 1, five days a week has been the rule.

Bethlehem Steel—Shipments of rails and track accessories from the Lackawanna plant of Bethlehem Steel Co. increased 5 per cent in the first four months this year, compared with the same period last year. Bethlehem's production of freight cars at Johnstown, Pa., shows a slight increase in that period, a spokesman says.

Morrison Railway—Unfilled orders will keep the Bailey avenue plant busy through next May as railroads "appear to be spending about as much money for equipment this year as they did in 1956," reports Raymond L. Morrison, president of Morrison Railway Supply Corp. Morrison is booked for a year to build cabooses and has had heavy billings of maintenance-of-way equipment and tools.

Symington-Gould—Production of steel castings for cars and locomotives is "holding steady" at a high level at the Depew plant of the Symington-Gould Corp., declares Raymond P. Brewer, vice president-treasurer.

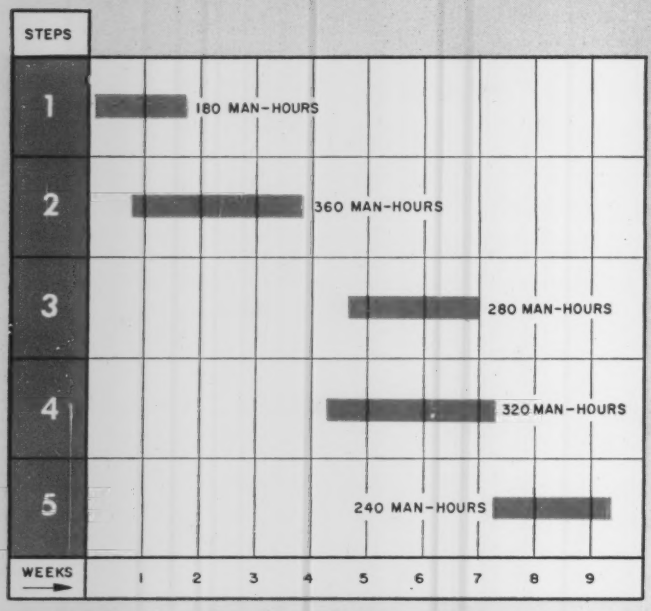
Pratt & Letchworth—Steady production and a good level of ordering of its steel castings for rail equipment is reported by a spokesman of this Buffalo foundry. Since the big upturn came in car ordering in December, 1955, there has been "no significant decline" in business.

Little Big Inch Transformed

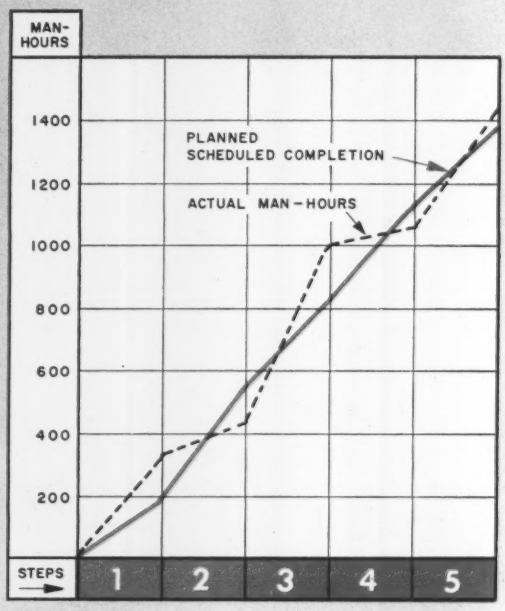
The Little Big Inch pipeline will start operating as a common carrier of petroleum products within six weeks, Orville S. Carpenter, president, Texas Eastern Transmission Corp., Shreveport, La., reports. On June 21, the Federal Power Commission authorized removal of the line from natural gas service.

Construction of a 14-in. line from Seymour, Ind., to Chicago will begin in 30 days; the line will be in service in September.

Research Work Is Scheduled at Martin Co.



1 **EACH PROJECT is broken into time segments . . .**



2 **RESULTS are dramatized . . .**

How To Aid Your Engineers

About 40,000 are needed by industry. Educators say the shortage will last ten more years at least. But more effective use of what you have can help solve the problem

"IF we could improve the efficiency of our present engineers by only 5 per cent, we would add as much to our engineering forces as will the entire graduating class of 1957," Alfred Iddles, president, Babcock & Wilcox Co., New York, told a recent Michigan State University conference.

1 **Plan of Attack**—Such a program calls for: Greater use of technicians, better ways of motivating the engineer, more accelerated training programs, more on-the-job training, more planning and scheduling of research work and better understanding of the engineer's needs.

2 **Use More Technicians**—Some companies are beginning to explore sources other than the colleges for new talent. Monarch Aluminum Co., Cleveland, supplements its engineering staff with recruits from its semiskilled labor forces. Says John Keating, vice president and general manager: "We might, for example, find a foundry machine operator who has a special aptitude; train him; and use him as a draftsman or blueprint reader."

The use of technicians is growing. But to get the greatest returns, you must encourage engineers to be less hesitant, to delegate and show them the value of conserving their time for work which only they can do.

Re-evaluate the duties of each engineer. You can trim off nonengineering and repetitive jobs and give them to less-skilled employees. In the process, you improve efficiency and cut costs.

Mr. Iddles urges industry to encourage and assist in establishing training schools for technicians. He said: "Effort must also be made to create an atmosphere of pride in being a technician."

3 **Use Motivation**—The engineer wants to be recognized as a professional. But studies show that industry has not fully recognized this need. In a survey made by the National Society of Professional Engineers, only 24 per cent of the engineers contacted felt management recognized them as professionals. Only 22 per cent felt they were recognized as management.

Babcock & Wilcox, in a "zest-building" effort, organized a Tech-

nical Papers Committee. These worthwhile returns are reported:

1. It made engineers realize that the company appreciated the extra effort of preparing papers.

2. The quantity and quality of the papers improved.

3. The papers are listed in a publication which goes to all employees and to influential pepole in all plant cities. It gives engineers recognition and enhances their professional status.

4. Most important, this plan has uncovered "much talent among the younger engineers, enabling them to relieve seniors from time-consuming tasks."

Mr. Iddles recommends these motivation techniques: 1. Tell the engineer what's going on. 2. Give him a chance to tell you what he thinks. 3. Place him in the job he's best suited for. 4. Define his job. 5. Periodically tell him how he's doing. 6. Use indirect "zest-building" methods. 7. Expose him to challenging experiences. 8. Work him near his capacity. 9. Give him proper financial compensation.

Compensation should be based on individual merit and not according to some mass formula, Mr. Iddles believes. He also said: "Tempting college graduates with disproportionate starting rates is a dangerous and futile practice which will come to haunt us as the employee progresses in his job."

4 **Use Machines**—J. D. Rollins, vice president for engineering of U.S. Steel Corp.'s American Bridge Division, recommends another approach—the electronic brain. He says it saved 10,000 engineering man-hours on the Mackinac Bridge project. (Machines were used to calculate stresses and compute cable lengths, sag and deformation.)

Other firms report increased use of computers and business machines. Operated by clerks, they relieve the engineer of routine duties.

5 **Use Understanding**—A study made by the University of Michigan's Institute for Social Research indicates that the needs of junior and senior engineers differ: The junior seems to require attention from, and contact with, his superior to build his confidence and increase his efficiency and scope of knowledge.

Close contact between a senior researcher and his chief may have harmful effects. States William G. Caples, vice president, Inland Steel Co., Chicago: "His independence seems to be taken away, and this can undermine initiative."

The study also shows that top performance is gained when management follows a "participatory" plan of leadership in dealing with its scientists.

6 **Use Training**—A survey by the Bureau of National Affairs, covering 89 companies, showed that only 15 per cent of the companies conduct formal training sessions for professionals. But they report that 55 per cent of large companies and 48 per cent of the small ones supplement training with college courses.

AC Spark Plug teaches its key personnel how to be creative. The project, started in 1952, has been expanded to include advanced courses. It has four phases: 1. The employee's creative ability is "measured" by a series of tests. 2. He is given training courses in the creative approach. 3. He is placed in that post where his creative ability will be best used. 4. Channels of communication are provided to get his new ideas to proper officials.

7 **Use Scheduling**—E. G. Uhl, vice president of engineering, Martin Co., Baltimore, says the engineer should be given deadlines to meet. It "serves as a goal for him to work toward" and provides an "inducement to reach that goal."

If you don't make him plan ahead, he'll just go on improving his present project. Says Mr. Uhl: "He will understandably be interested in greater and greater refinement until you tell him: This is what the plan calls for. Now is the time to stop.

"Engineers must also be taught the importance of timing," believes Mr. Uhl. They may get the solution too late. A 90 per cent solution today is probably better than 99 per cent a year from now.

8 **Use Your Talent**—Valuable manpower is often lost because an engineering graduate is kept on a routine job too long. General Electric Co. has developed a method which its feels will enable it to move a man up as soon as he "outgrows" his previous job.

Its system, called the Engineering Personnel Register, enables it to match all engineers with opportunities, resulting in a better and faster placement procedure.

9 **Face the Challenge**—Engineers make up 0.8 per cent of the labor force; in ten years the figure will be 1.4 to 1.7 per cent. (We will have about 1.2 million engineers then.) But we will need 1.6 million to 1.7 million in 1975, estimates Mr. Caples. The only answer: Better use of what you've got.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.

Workers Given Better Deal

Workmen's compensation laws were liberalized in 23 states this year, the Commerce Clearing House, Chicago, reported. Here are the major changes:

Benefits were increased for on-the-job accidents.

Coverage was extended to more workers.

Additions were made to the list of occupational diseases for which compensation may be paid.

Maximum weekly benefits were raised $2 to $4.

Executives Go Back to School

Universities are bolstering their curriculums with courses designed to bring executives back to school.

The National Industrial Conference Board states that there are almost twice as many courses offered to executives today as there were in 1954. Reasons:

Association with executives from other companies leads to a more concentrated exchange of ideas, experience and points of view.

Industry wants more "ready-made" executives.

The need for funds encouraged universities to offer such programs in the hope of gaining financial support from business and industry.

Business is rapidly expanding, creating a number of executive openings.

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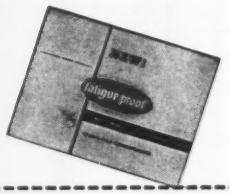

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Big Three aim to keep balloon earthbound as it takes . . .

Preview of Union Wants

THE UAW probably will swap the short work week for a basketful of additions to established provisions in auto company contracts. And it won't have to strike for them.

That's today's feeling in Detroit as labor and management prepare for the 1958 showdown.

But attitudes change from week to week, and a major shift in the industry's economy could bring a reversal in current thinking.

The union's demands won't be finalized until January when it holds a special convention in Detroit. Neither side is predicting officially, but, unofficially, the pieces are falling into place.

What Walter Wants — Walter Reuther is quick to point out the UAW has not decided what form shorter work schedules will take. It could be fewer hours per day.

But Mr. Reuther says he personally favors the four-day week. Rank and filers are expected to take the hint.

Costs Too Much—It's also clear that to make up for the loss in pay resulting from a four-day week, auto workers would have to get a minimum wage hike of almost 60 cents.

The companies won't pay this, and Mr. Reuther knows it.

In addition, the evidence is beginning to point to General Motors as the company under the gun when negotiations open.

Short Week Out — Historically, GM has been most ready to agree to demands which are within previous bargaining experience and to hold out against points which are matters of principle or new to the industry.

Industrial relations prognosticators take this to mean that by hitting GM first, the UAW doesn't really expect to get the short work week—this time.

They do expect to see the union cash in on a bigger package than ever before.

Quid Pro Quo—More money will be in the offing. Mr. Reuther has indicated he thinks the workers should get a 10-cent pay boost regardless of what happens to short week demands.

An informal poll of optimists and pessimists on industrial relations staffs puts the hike at 7 cents.

Fringe on Fringe — Additional demands fall into the broad bargaining outline laid down by the UAW chief at Atlantic City, N.J., this spring. (See STEEL, Apr. 15, p. 77.)

Unemployment benefit (SUB) programs will wind up with longer pay periods but no change in the amount put into the funds, think the negotiators.

A settlement along the line of 39 weeks of payments and less stringent eligibility requirements seems to be in the works.

Skilled Demands—Don't sell the Society of Skilled Trades short. To assert themselves within UAW ranks, the skilled trades probably will go for extra fringe benefits. One which keeps cropping up is three weeks' vacation for ten years' employment.

Pensions and insurance aren't

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likely to prove big stumbling blocks this time. The UAW is setting up a geriatrics aid program for workers. It will try to enlist management aid at the bargaining table or before.

Transfer Rights—Heavy emphasis will be placed on what happens to workers when jobs shift from one plant to another.

As it looks now, both sides should arrive pretty close to the sort of terms the UAW and Chrysler settled on during their disputes this spring.

Apparently, the only point that will cause little excitement at the bargaining table is the two-year contract. The union wants it. Industrial relations people feel they'll get it.

Underriding all this guesstimating is an oft hinted, but unspoken, thought: This may be the last time the auto companies will bargain individually.

Chrysler Scores Record Half

Chrysler Corp.'s first half sales rose above $2 billion. This averages out to earnings of about $10 a share.

The company also expects to operate at a profit during the traditionally slow third quarter.

Last year, Chrysler reported first half earnings of $2.14 a share on sales of $1.4 billion. The previous record was made in 1955 when sales rose to $1.8 billion.

Chrysler produced 719,000 cars in the first six months, compared with 474,000 in the same 1956 period. This gives it a solid 21 per cent of the total market.

Ward's Automotive Reports estimates Chrysler will build 112,200 more cars during July.

Motordom earlier had predicted this would be a make or break year for the corporation. It now is definite that Chrysler will be strongly in the black at the end of 1957.

Its cash and marketable securities bulk close to $344 million, excluding the last installment ($62.5 million) of a $250-million loan which the firm received this month. It represents the major indebtedness of the company.

Expenses in bringing out 1958 models will be relatively light. One estimate is $90 million. The company will spend upwards of $125 million on capital expenditures next year.

Ford Leads at Half

Chevy is trailing Ford by 22,000 units as the production race moves into the third quarter.

Plymouth is well ahead of Buick in third place. Oldsmobile has dropped back to fifth position.

Pontiac shows a slight gain in output over last year's. It's still in No. 6 slot.

Here's how the leaders rated at the end of the first week in July:

	1957	1956
Ford	839,500	719,977
Chevy	816,895	895,500
Plymouth	390,359	253,194
Buick	241,323	327,327
Olds	231,077	255,961
Pontiac	200,819	194,050

Luxury cars are having their own race. The outcome here is traditional.

Cadillac sweeps the field, followed by Chrysler, then Lincoln. Imperial usually is way behind. This year, however, it has quadrupled its 1956 output. Counting the two Chrysler makes, the company is well ahead in luxury car competition.

The Imperial actually is ahead of Lincoln so far this year.

U.S. Auto Output

Passenger Only

	1957	1956
January	642,089	612,078
February	571,098	555,596
March	578,826	575,260
April	549,239	547,619
May	531,365	471,675
June	500,271	430,373
6 Mo. Total	3,372,888	3,192,601
July		448,876
August		402,575
September		190,726
October		389,061
November		581,803
December		597,226
Total		5,802,808

Week Ended	1957	1956
June 8	129,517	104,984
June 15	125,372	100,689
June 22	118,805	105,148
June 29	125,909	103,034
July 6	73,255†	68,110
July 13	123,000*	112,361

Source: *Ward's Automotive Reports.*
†Preliminary. *Estimated by STEEL.

Here's how this race looks at the end of the July Fourth holiday:

	1957	1956
Cadillac	87,084	85,431
Chrysler	74,279	60,944
Imperial	24,971	5,764
Lincoln	23,468	28,440

Buick Cuts Vibration

Buick engineers have developed a nodal point engine mounting system to cut down vibration.

Nodal points are spots of minimum vibration. Buick mounts its engines on rubber pads at these points.

The engine has a normal amount of movement without transmitting the effects to body and frame.

Leonard Morrish, head of Buick's acoustics division, says nodal point mounts are placed at an angle to the center of the crankshaft to further increase lateral stability of the engine.

Exhaust Notes

- One of the major truck manufacturers is experimenting with a diecast aluminum bumper—may introduce it next year.
- GM's research staff has developed an electronic pulse synchronized unbalance indicator (PSUI) which detects and corrects unbalance in auto engines during preliminary testing.
- British Motor Corp. will produce an Australian designed car at its new $27-million plant at Victoria, Australia. The vehicle will compete with GM's Holden, which is manufactured and sold in the same country.
- Bostrum Mfg. Co., Milwaukee, is setting up research laboratories to study ride vibration and its effects on people. The company recently introduced a torsion suspension system for truck and tractor seats. It could devise a similar unit for autos.
- Greyhound Corp. has agreed to buy busses from more than one supplier if possible. It also has agreed not to enter a development contract with GM for four years.
- Chrysler Corp. will pay $19.6 million in lieu of vacations to some 102,000 hourly rated employees this year.

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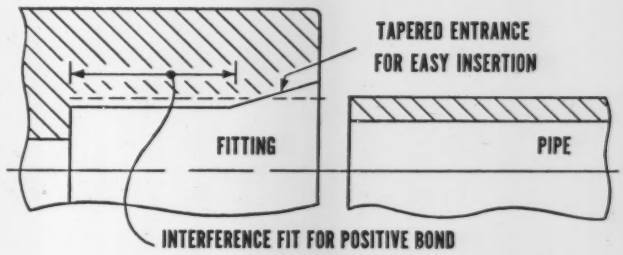
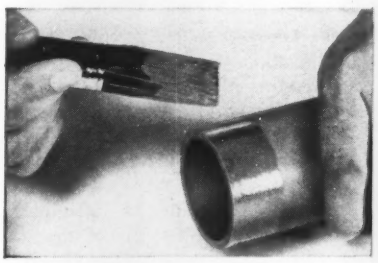
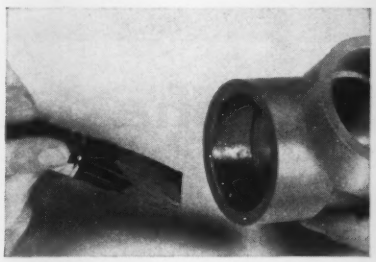


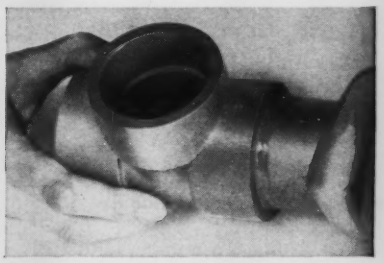
By combining tapered entrance socket and a .005 inch interference fit—even when the pipe is at the small limit of the diameter tolerance and the fitting at the large limit of its diameter tolerance—UscoWeld is easily installed, and the strongest solvent-weld joint available.



Apply Uscolite CP cement to the outside area of the pipe that is to be in contact with the socket.



Next apply cement uniformly to entire inside area of *tapered entrance* socket.



While both cemented surfaces are still wet, insert pipe in fitting and push until pipe bottoms against shoulder in the fitting.

ADVANTAGES

- fast, easy to assemble—tapered entrance provides easy insertion of pipe
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Mechanical Goods Division

United States Rubber

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THIS odd-looking machine has a case every day.

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It's been shaking its six ton bulk seven hours a day for better than five years. Imagine the strength of the standard nuts and bolts (made to ASTM specification A325) that have held its heavy metal parts together under such continual vibration.

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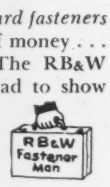

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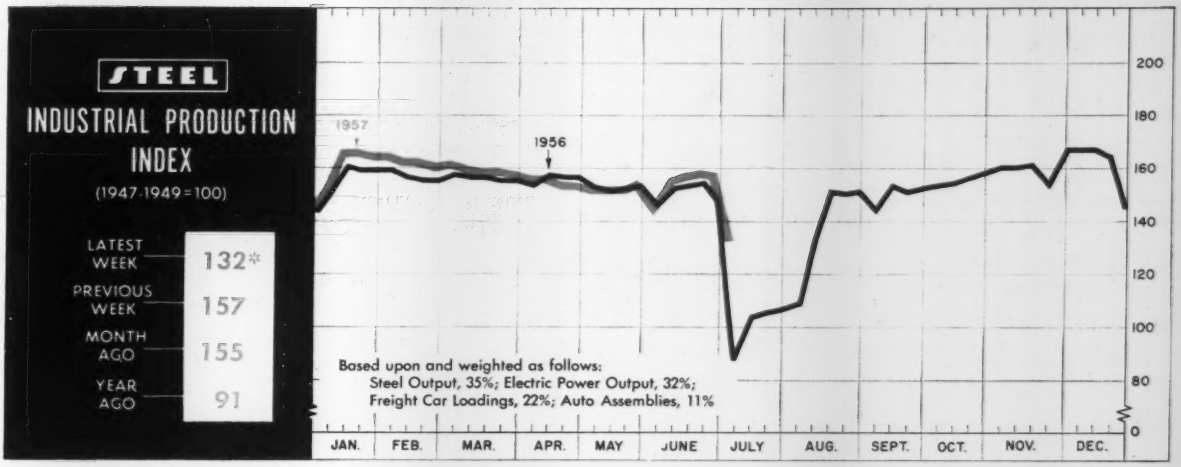

*Week ended July 6.

Eight Business Barometers Point Sidewise

EIGHT leading business indicators show that the economy is still in a sidewise movement, with no clear indication of a break either way. (Most of the information, the latest available, runs through May.)

Tagged by the National Bureau of Economic Research as the most sensitive barometers of the nation's economy, they supposedly forerun peaks in general business from 2.5 to 10.5 months and troughs from 1.7 to 7.5 months. Four are up strongly; three are down; the other, business failures and liabilities (inverted), shows a split pattern. Here's how they look:

Failures, Liabilities — On the basis of weekly reports from Dun & Bradstreet Inc., there are indications that business failures in June eased off from the record pace of earlier months. But the general trend is for an increase in failures during 1957, so this must be counted as a forerunner of a trough. During May, liabilities decreased. Again, the general trend is unfavorable compared with the year-ago position and probably indicates the trough column.

Industrial Stocks — The Dow-Jones average of 30 industrials has been climbing since February and last week was expected to come close to breaking the record of 521.05 set on Apr. 6, 1956. Favorable financial reports for the first and second quarters are the main cause of this strength.

New Orders—Although at this time nothing definite is known about total new orders for durable goods in May and June, the overall trend still is below that of a year ago.

Residential Building—The floor area of residential building has been in a typical upswing since January, according to F. W. Dodge reports. The total for the first five months is still a bit below that of the corresponding period last year, but a decline started in May, 1956; the trend continued up this year.

BAROMETERS OF BUSINESS	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	2,057[1]	2,009	317
Electric Power Distributed (million kw-hr)	10,910[1]	12,111	10,391
Bituminous Coal Output (1000 tons)	7,910[1]	10,395	7,198
Petroleum Production (daily avg—1000 bbl)	7,000[1]	7,190	7,086
Construction Volume (*ENR*—millions)	$483.6	$330.1	$389.8
Auto, Truck Output, U. S., Canada (*Ward's*)	97,697[1]	160,387	89,236
TRADE			
Freight Car Loadings (1000 cars)	465[1]	732	478
Business Failures (Dun & Bradstreet)	271	241	249
Currency in Circulation (millions)[3]	$31,146	$30,849	$30,763
Dept. Store Sales (changes from year ago)[3]	+2%	+9%	+7%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$25,736	$23,562	$20,226
Federal Gross Debt (billions)	$270.4	$270.5	$272.7
Bond Volume, NYSE (millions)	$18.7	$21.8	$12.3
Stocks Sales, NYSE (thousands of shares)	9,257	9,486	7,874
Loans and Investments (billions)[4]	$87.0	$87.7	$85.6
U. S. Govt. Obligations Held (billions)[4]	$24.9	$25.6	$26.6
PRICES			
STEEL's Finished Steel Price Index[5]	239.15	228.59	210.45
STEEL's Nonferrous Metal Price Index[6]	217.0	218.0	275.7
All Commodities[7]	117.4	117.1	113.9
Commodities Other Than Farm & Foods[7]	125.4	125.2	121.4

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1957, 2,559,490; 1956, 2,461,893. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-1939=100. [6]1936-1939=100. [7]Bureau of Labor Statistics Index, 1947-1949=100.

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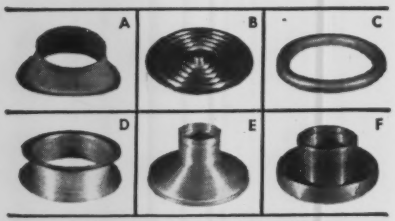
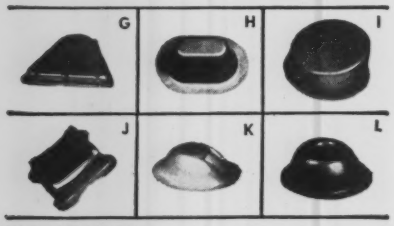


METAL SPINNING AND SPINFORMING:
Typical items: **A—Aircraft detail; B—Decorative cover; C—Retainer ring; D—Winding reel; E—Electronic shield; F—Electrical detail.**



HYDROFORMING:
Typical items: **G—Aircraft detail; H—Spindle cover; I—Aircraft detail; J—Auto bracket; K—Light reflector; L—Air cleaner.**

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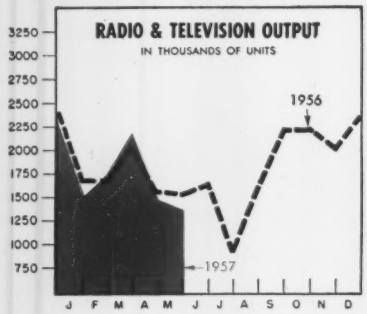
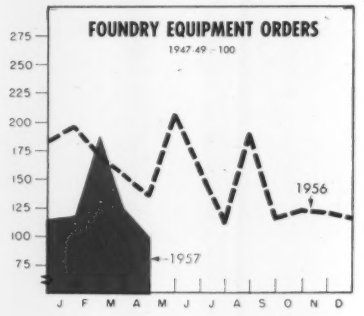
THE BUSINESS TREND



	Radio		Television	
	1957	1956	1957	1956
Jan.	1.086	1.079	450	588
Feb.	1.265	1.094	465	576
Mar.	1.609	1.360	560	680
Apr.	1.116	993	361	550
May	1,024	1.060	342	468
June	....	1.073	...	553
July	....	567	...	337
Aug.	....	991	...	613
Sept.	....	1.319	...	894
Oct.	....	1.349	...	821
Nov.	....	1.382	...	680
Dec.	....	1.715	...	627
Totals	....	13.982	...	7.387

Radio-Electronics-Television Mfrs. Assn.

Charts copyright, 1957, STEEL.



	1957	1956	1955
Jan.	117.9	195.6	81.0
Feb.	188.4	169.0	90.4
Mar.	127.0	152.7	163.6
Apr.	101.1	135.2	178.6
May	....	207.0	145.7
June	....	156.7	186.8
July	....	110.3	213.4
Aug.	....	188.3	134.0
Sept.	....	114.7	156.7
Oct.	....	122.2	108.6
Nov.	....	121.0	154.4
Dec.	....	115.6	183.9
Avg	....	149.0	150.0

Foundry Equipment Mfrs. Assn.

Industrial Building—Here, too, a downtrend set in a year ago, but Dodge's figure for May shows a significant increase in industrial building floor space. Also, the year to date is ahead of the corresponding 1956 period.

Hours Worked—Three factors are mainly responsible for the decline in hours worked per week per employee: 1. Seasonal cutbacks. 2. Drive for greater economy in manufacturing and increased productivity. 3. Slight decline in production. Conclusion: The trough column.

Incorporations — D&B reports that businesses are still coming into being at a fast clip, but 1957 monthly totals are below the 1956 figures, again indicating the trough column.

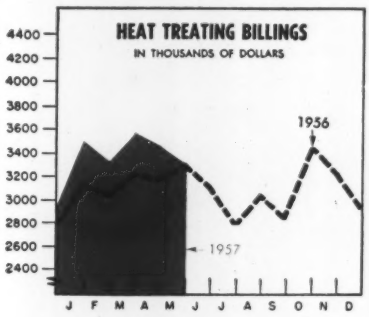
Wholesale Prices—Even though there was some leveling off in May and possibly June, July's steel price hike will send this index shooting skyward again. This is the least sensitive of the indicators, but historical patterns put it in the peak column.

Some observers say that July is the month to watch. They're getting apprehensive about the depth of the cut made in production by hot weather, mass vacations and other seasonal factors. They fear the slowdown may snowball and cool off business prospects for the fourth quarter. Others say wait until after Labor Day before getting too worked up about conditions. This group anticipates an upswing then, based mostly on introduction of new automobiles and a resulting gain in steel demand.

Gap Appears in Index

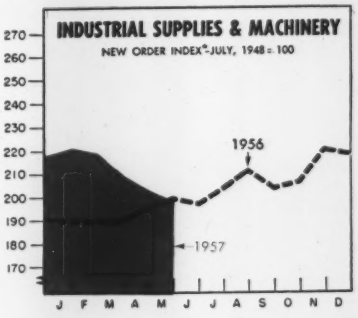
STEEL's industrial production index is now moving into the period when it will hold a considerable edge over the year-ago figures because of the steelworkers' strike then. During the week ended July 6, the preliminary reading was 132 (1947-1949 = 100), 41 points above that of the corresponding week of last year. All segments of the index took a breather over the July 4 holiday. They fell farther than usual for such a week because many industries extended the holiday over two days rather than one. Also, many industries scheduled their annual vacation periods to begin at that time.

The biggest decline came in freight car loadings, mainly because the coal industry started its vacation period on June 28. Not



	1957	1956	1955
Jan.	3,494.7	3,116.4	2,181.0
Feb.	3,337.9	3,124.8	2,184.5
Mar.	3,571.6	3,330.9	2,599.5
Apr.	3,462.6	3,166.2	2,579.5
May	3,311.4	3,350.7	2,644.4
June	.....	3,094.5	2,645.1
July	.....	2,762.5	2,180.0
Aug.	.....	3,040.7	2,535.6
Sept.	.....	2,832.9	2,666.8
Oct.	.....	3,442.3	2,897.2
Nov.	.....	3,205.7	2,935.7
Dec.	.....	2,931.2	2,891.1

Metal Treating Institute.



	1957	1956	1955
Jan.	221	190	160
Feb.	219	190	166
Mar.	210	190	171
Apr.	203	195	172
May	199	199	177
June	...	197	189
July	...	203	182
Aug.	...	211	186
Sept.	...	203	196
Oct.	...	206	195
Nov.	...	220	194
Dec.	...	218	191

*Seasonally adjusted.
Amer. Supply & Machinery Mfrs'. Assn.

until the week ended July 20 will coal loadings be back to near normal. After that, the nation's shippers anticipate loadings will pick up in the third quarter and move 8.6 per cent ahead of the year-ago period. For the first time this year, the shippers probably will be right. The estimated increase represents roughly the amount of business the railroads lost during the steel strike last year.

The auto industry contributed heavily to the holiday weakness. Most producers shut down for two days and cut back on what little Saturday work they had been doing. The steel industry slowed down a bit, but still put out 2,009,000 net tons of steel for ingots and castings during the week. Last week, the American Iron & Steel Institute estimated that production edged back up to 2,057,000 net tons. The output of electric energy dipped beneath 11 billion kw-hr for the first time since the Memorial Day week because of reduced factory consumption and milder weather. This segment of industry is still maintaining an advantage of about 5.5 per cent over year-ago figures and will improve that showing during the next six weeks—again because of last year's strike.

Construction Costs Zoom

The only reports from the construction industry which are causing much alarm so far this summer concern costs. *Engineering News-Record* reports they rose to new highs in July. The construction cost index moved 3 points above the May figure to 724.15 (1913 = 100), and the building cost index rose 2.5 points to 506.62. The increase was caused by boosts in wages. The steel price hike, not included in the July computations, will add about 7 points to both indexes in August, *EN-R* estimates.

Both construction put in place and awards for future construction brought smiles from the industry. The departments of Labor and Commerce report that expenditures in June increased 8 per cent over May's and set a new high of $4.35 billion for the month. This raised the first half total for 1957 to $21.5 billion, 3 per cent above last year's record. This is approximately the amount that costs have risen since then, leaving the physical volume at year-ago levels.

EN-R says the June contracts established a new monthly high for 1957 at $1.56 billion, topping the May total by 5 per cent.

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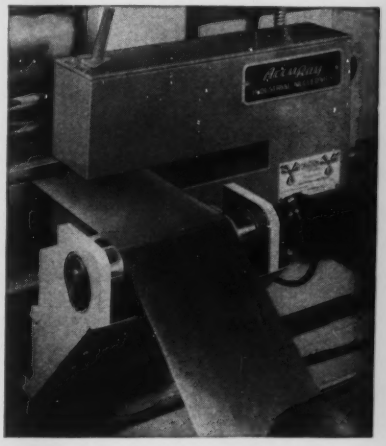

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To meet the increasing demands of electronics and other industries for *uniform* closer tolerances, Somers Brass has taken advantage of one of the latest developments in the electronic field by installing the first Accu-Ray gauges in the non-ferrous industry. These units make it possible to check and control thickness from edge to edge throughout each coil to a degree of accuracy never before known.

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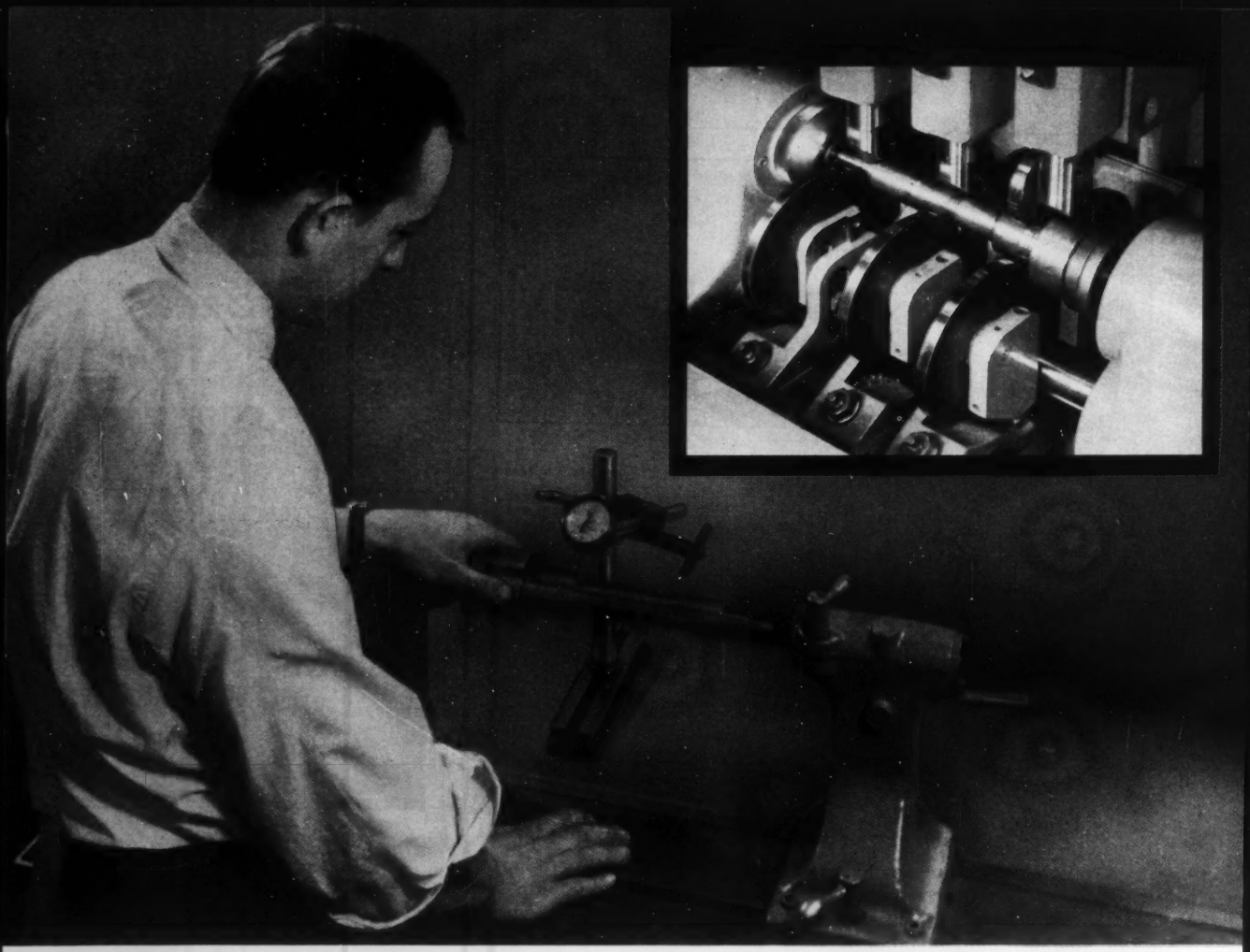

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This shaft reads true because it was not allowed to distort during hardening.

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Since cold straightening was completely eliminated, he saved valuable production time and expense.

The quenched shaft also has less residual stress.

With this machine you roll parts under pressure continuously as you quench them. The operator puts the hot part on the lower rollers and starts the machine.

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The Gleason No. 140 Rolling Quench Machine is suited equally well to both small and large quantity work. It accommodates shafts $\frac{9}{16}$″ to 4″ in diameter, 6″ to 40″ in length, with integral cams or shoulders up to 8″ diameter.

Tooling can be arranged to hold parts on diameters or centers. Unusual shapes can be handled with additional tooling.

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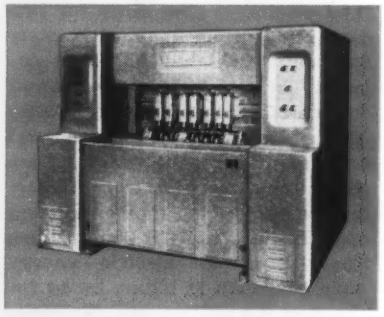

The Gleason No. 140 Rolling Quench Machine also handles multiple quenching of short shafts.

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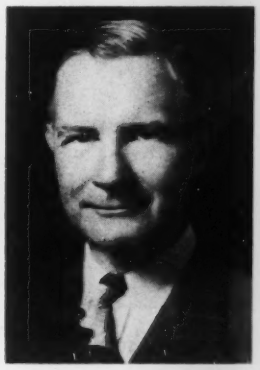

ARTHUR D. BACHTEL
mills supt. at Kaiser Steel

DONALD McLEOD
Bathey eng. and purchasing dir.

Paul M. Hafer, superintendent of **Federal Pacific Electric Co.'s** Cleveland manufacturing plant, was promoted to plant manager.

Robert L. Rice was promoted to general sales manager of **Fischer & Porter Co.**, Hatboro, Pa. He was manager of the water and waste division and is replaced by **James Haskett.**

Stanley J. Gorski was made director of purchases at **Todd Co.**, Rochester, N. Y. He succeeds **Bruce Bergener** who assumes other duties with the company.

Edward J. Young was made quality control manager of **Ford Motor Co.'s** assembly plant in Buffalo. He succeeds the late **George C. Nyman.**

Alfred F. Duttweiler Jr. was named plant manager, **Universal Die-Casting Division,** Hoover Ball & Bearing Co., in Saline, Mich.

Walter J. Reeves was elected vice president - sales, **Electra Motors Inc.**, Anaheim, Calif. He was general sales manager.

Carl O. Larson was made superintendent, machine division, **Moore Special Tool Co. Inc.**, Bridgeport, Conn. He succeeds **Hadar Wahlquist,** retired.

Jack A. Scarlett was elected vice president - manufacturing, **United Welders Inc.**, Bay City, Mich.

Don Jenson was appointed chief engineer at **Chemtrol Corp.**, Compton, Calif.

Arthur D. Bachtel was made superintendent of the blooming and structural mills at **Kaiser Steel Corp.**, Fontana, Calif. He has been with the company since 1948, serving as assistant and acting superintendent in the same departments.

Pressco Casting & Mfg. Corp., Chesterton, Ind., elected **J. R. Metcalf** vice president-production. He formerly was with Kiekhaefer Corp.

James K. Norris was elected president, **J. Paul Singleton,** vice president of **Central Foundry Co.**, Newark, N. J. Mr. Norris succeeds **J. J. Nolan Jr.** He was chairman of Utica Drop Forge & Tool Co. before it was purchased by Kelsey-Hayes Wheel Co. Mr. Singleton was manager of the company's plant at Holt, Ala., and is now in charge of all operations there.

Norman Roberson was made production manager of **Pacific Coast Engineering Co.**, Alameda, Calif.

Harris-Intertype Corp., Cleveland, elected presidents to head its operating divisions. Harris-Intertype is the new name for Harris-Seybold Co., into which Intertype Corp. was recently merged. **George C. Houck** is president of Harris-Seybold Co., which continues under the former name as a division. **Harry G. Willnus,** former president of Intertype Corp., continues as president of the Intertype Co. Division. Both Mr. Houck and Mr. Willnus were elected vice presidents of Harris-Intertype.

Bathey Mfg. Co., Plymouth, Mich., appointed **Donald McLeod** director of engineering and purchasing, a new post. He served the company in an engineering capacity for the last four years. Prior to that he was chief engineer at Gar Wood's Wayne, Mich., division plant.

Charles E. Huddleston was made director of engineering at **Lewis Welding & Engineering Corp.**, Bedford, O. He was engineering manager, arms and ammunition division, Olin Mathieson Chemical Corp.

Edward G. Merk was made sales manager, **Diamond Machine Tool Corp.**, Pico, Calif. He was vice president - sales at Benchmaster Corp.

Michael Flynn Mfg. Co. Philadelphia, appointed **Charles R. Malmister** western divisional sales manager for its extrusion division. He was west coast sales manager for B & T Metals.

Seth H. Stoner was made general manager, **New Departure Division,** General Motors Corp., Bristol, Conn. He succeeds **Paul W. Rhame,** retired.

John H. Bryan was made sales manager, **Hankison Corp.**, Pittsburgh.

Durwood A. Blaisdell was elected executive vice president, **Baird Machine Co.**, Stratford, Conn.

Earl V. Pierce was made assistant sales manager, Kenosha, Ill., divi-

DONALD E. CUMMINGS

JOHN K. STEWART

Air Products Inc. promotions

HOWARD B. CASPER

JULES C. LAEGELER

Frank G. Hough Co. appointments

sion, **American Brass Co.** He was Chicago district sales manager.

Air Products Inc., Allentown, Pa., appointed **Donald E. Cummings** general sales manager. He is succeeded as steel mill sales division manager by **John K. Stewart**, formerly a sales engineer.

Edward F. Dick was made superintendent of production, cathode ray department, **Westinghouse Electric Corp.** at Elmira, N. Y. **Joseph A. Rima** was made engineering manager; **Harold H. May**, superintendent of manufacturing engineering.

Edwin N. Hargrave was made sales manager, hoist and crane division, **Fabricated Steel Service Inc.**, North Hollywood, Calif.

R. H. Goodwin was named general sales manager, **Electronic Wire & Cable Corp.**, Los Angeles.

Max Moore was named chief engineer for the Precision Potentiometer Division of **General Controls Co.**, Glendale, Calif.

Cameron Iron Works Inc. appointed **J. F. Allen** manager of its new guided missile plant in Houston.

Henry F. Banzhaf was made assistant to the general manager, general products division, **Allis-Chalmers Mfg. Co.**, Milwaukee.

F. A. King was made sales manager, safety products division, **Mine Safety Appliances Co.**, Pittsburgh.

Everett W. Lundy was made general sales manager, **Peerless Pump Division**, Food Machinery & Chemical Corp., Los Angeles. Former assistant sales manager, he succeeds **B. A. Tucker**, retired.

Bernard S. Reckseit was named vice president-engineering by **Ransohoff Inc.**, Hamilton, O. He was chief engineer.

Frederick D. Fernsler was named manager of the newly formed nut department in the aircraft division of **Standard Pressed Steel Co.**, Jenkintown, Pa.

Gregory B. Littell Jr. was made superintendent of **Trane Co.'s** Scranton, Pa., plant, succeeding **Richard Schiewetz**, who will manage Trane's new southern plant at Clarksville, Tenn.

Frank A. Depweg was made manager of a new sales department for special products at Hamilton Division, Hamilton, O., **Baldwin-Lima-Hamilton Corp. Howard Matre** was named sales engineer.

Howard B. Casper was made purchasing agent for **Frank G. Hough Co.**, Libertyville, Ill. He was assistant purchasing agent. **Jules C. Laegeler** was made chief engineer.

Glenford M. Shibley was named manager of territorial sales at **Patterson Foundry & Machine Co.**, East Liverpool, O., a subsidiary of Ferro Corp.

Joseph M. Gebel was made manager of the Detroit office of **R. K. LeBlond Machine Tool Co.**

Fred A. Rueter was made head of the new methods and market development program of **Malsbary Mfg. Co.**, Oakland, Calif. He will have headquarters in Pittsburgh. **Stanley Shea** succeeds Mr. Rueter as eastern regional sales manager. **Robert L. Garrison** replaces Mr. Shea as midwestern sales manager.

Richard I. Enzian was made

WALTER L. RYE

LESTER A. EDWARDS

ANTHONY J. LUCAS

Cincinnati Gear Co. executive appointments

Cincinnati Gear Co., Cincinnati, appointed **Walter L. Rye** plant manager; **Lester A. Edwards**, sales manager; **Anthony J. Lucas**, chief engineer-methods, tooling, purchasing and engineering.

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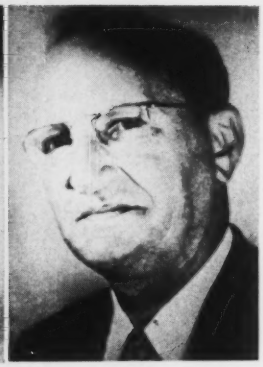
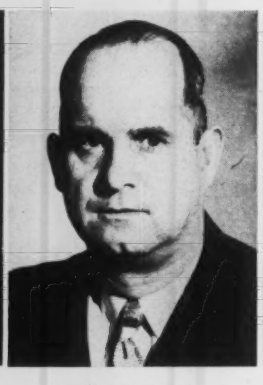
Buflovak Equipment Division

R. K. HOFFMAN
Acme Precision Products v. p.



ROBERT A. SCHAFER
Baker Bros. v. p.-engineering

DONALD F. LEVLEIT
Veet Industries gen. mgr.



CLAIR F. VOUGH
IBM Electric Typewriter post

RAY ST. ONGE
Process Instruments product mgr.

manager of wrought iron sales for **A. M. Byers Co.**, Pittsburgh.

Donald F. Levleit was made general manager of **Veet Industries,** East Detroit, Mich. He was factory manager of the Detroit plant of Continental Motors Corp.

Clair F. Vough was promoted to the new post of general manager, electric typewriter division, **International Business Machines Corp.**, at Lexington, Ky., where a new typewriter plant and laboratory are built. He continues to head the present plant in Kingston, N. Y.

William N. McArdle fills the new post of manager-aircraft products for **United States Steel Supply Division,** U.S. Steel Corp. He is at Chicago.

J. E. Kunz was named casing products sales manager, tubular division, **A. O. Smith Corp.** He is in Houston where he formerly served the division as assistant regional sales manager.

Ray St. Onge was made product manager for all instruments of **Process Instruments Division,** Beckman Instruments Inc., Fullerton, Calif. He was on the Beckman field engineering staff, responsible for the New York and Detroit areas.

Henry Becker was made manufacturing engineer for **McCulloch Motor Corp.'s** new Canadian plant scheduled for completion in September at Toronto.

George H. Dremann was made chief engineer, **Moffett Engineering Inc.**, Albany, Calif. He was assistant chief engineer at Bedford Foundry & Machine Co.

William F. Bohannan was made field research engineer, **Denison Engineering Division,** American Brake Shoe Co., Columbus, O.

C. W. Boyle was made sales manager, Plasteel Division, **Plasteel Products Corp.**, Washington, Pa. He was construction manager.

Thomas L. Price was appointed manager of manufacturing at the Buffalo plant of **Buflovak Equipment Division,** Blaw-Knox Co. He was formerly with Bridgewater Machine Co., Akron. Previously he served as director of manufacturing, Hydraulic Press Co., Mt. Gilead, O.

R. K. Hoffman, manager of the engineered products division of **Acme Precision Products Inc.**, Dayton, O., was named a vice president.

Robert A. Schafer was elected vice president-engineering, **Baker Bros. Inc.**, Toledo, O. He was an engineering executive with National Automatic Tool Co.

Thomas A. Box was made manager of the production-material control division of **General Logistics,** Pasadena, Calif., subsidiary of Aeroquip Corp.

OBITUARIES...

John C. Banko, 46, superintendent, **Cleveland Tool & Die Co.,** Cleveland, died July 4.

Oscar Sjogren, 76, president and treasurer, **Sjogren Tool & Machine Co. Inc.,** Worcester, Mass., died June 26.

Carl G. Kopplin, 59, vice president, **Union Special Machine Co.,** Chicago, died July 2.

Gordon Lefebvre, general manager, turbo division, **Clark Bros. Co.,** Olean, N. Y., Dresser Industries, died June 27.

Albert G. Moore, 80, founder and president, **Moore Chrome Products Co.,** Toledo, O., died June 25.

Thomas M. Birmingham, 62, sales administration manager, **Electric Auto-Lite Co.,** Toledo, O., died June 26.

C. F. Nagel, 65, retired vice president, **Aluminum Co. of America,** Pittsburgh, died July 5.

Samuel R. Swenson, 71, chairman, **Midwestern Tool Co.,** Chicago, died June 27.

Charles F. Leitelt, 69, chairman, **Leitelt Bros.,** Chicago, died June 27.

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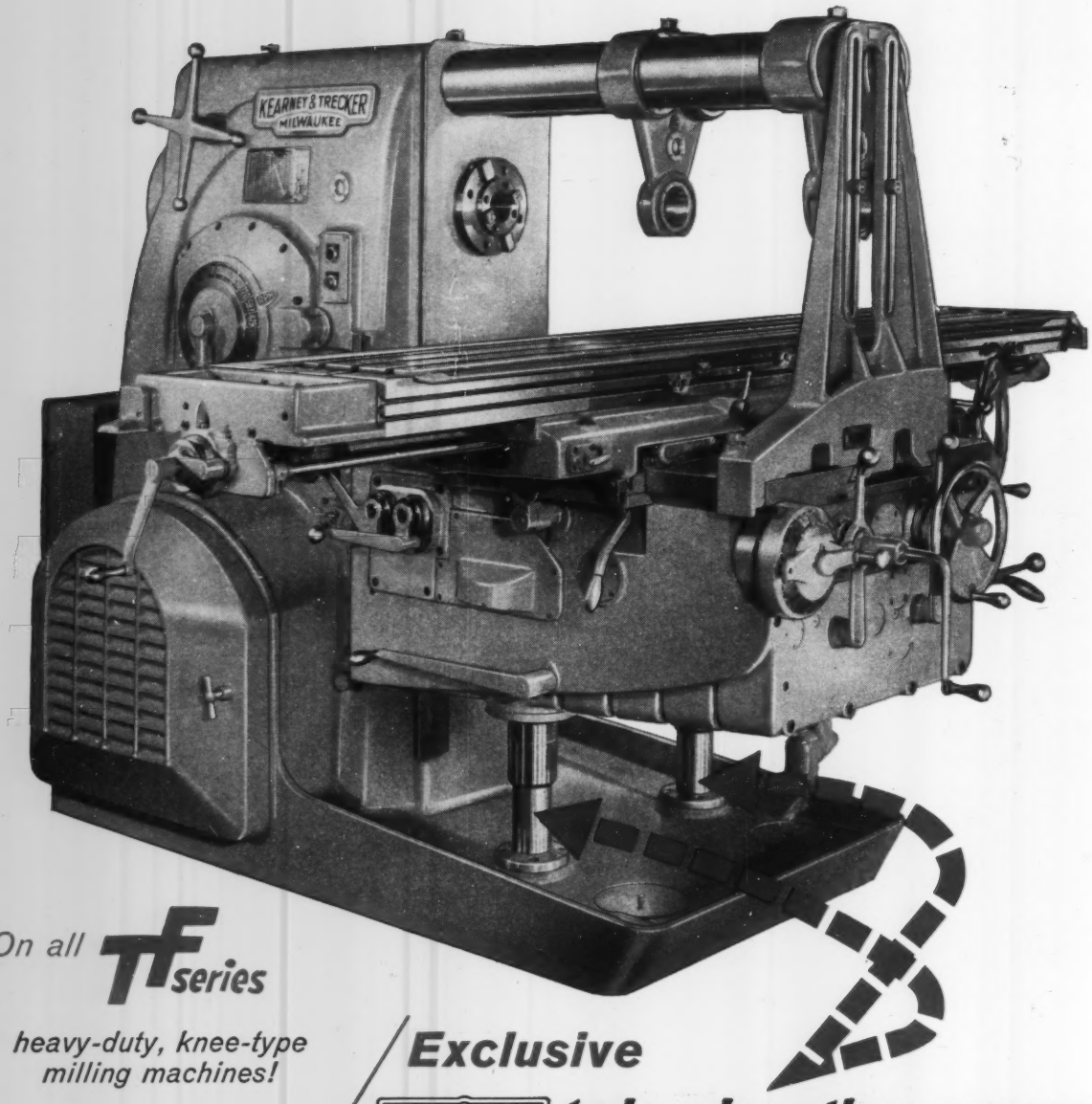

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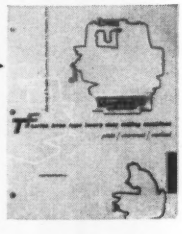

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More Steel Facilities

Washington Steel, St. Lawrence Steel and Tygart Steel broaden users' sources of supply

SEVERAL projects that will boost the supply of finished steel have been announced.

Washington Steel Corp., Washington, Pa., has launched a $1 million expansion of its stainless steel sheet and strip facility in that city. It includes enlargement of two of the shipping department buildings, plus a new carpenter shop building. A major piece of production equipment will be a 48-in. continuous strip grinder. All three continuous strand annealing and pickling lines will be lengthened.

Added flexibility will be gained because straight acid pickling, electrolytic pickling and Kolene salt bath pickling will be combined in one line. It will permit a wide choice of cleaning methods. The plant will be able to process all grades of stainless and some other newer metals with minimum delay.

Other collateral equipment to be installed includes a new roll grinder, air compressor, an 18-in. slitting line, resquare shears and a new acid disposal plant.

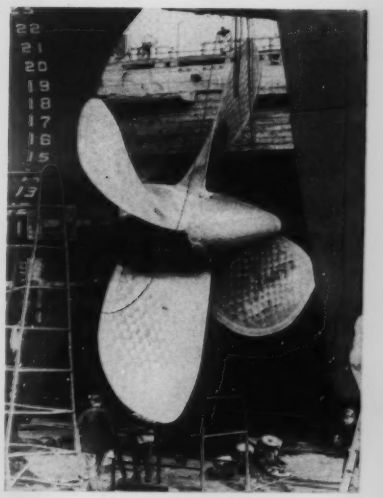
T. S. Fitch, president, in outlining the project, expressed his belief that stainless steel will continue to be a fast growing segment of the steel industry for at least another decade.

St. Lawrence Steel Corp., a newly organized firm, plans to start producing steel plates at the old armor plate plant in Gary, Ind. It has purchased all the machinery and equipment at the plant from American Auto Parts Co., Kansas City, Mo., and has leased the buildings for ten years.

The firm plans to produce steel plates for shipbuilding and pipe after converting the equipment.

Tygart Steel Rolling Corp., a division of Tygart Steel Co., McKeesport, Pa., is operating the facilities formerly known as Steel Rolling Co. Inc., 299 Meserole St., Brooklyn 6, N. Y. Officers of Tygart Steel Rolling are Sidney M. Feldman, president, and David S. Livingston, treasurer. John H. Claire is general manager and William Powell is mill superintendent. The Brooklyn property includes three cold reducing mills.

Supplementing the mills are 18 slitters, two flat wire mills and a complete line of round edging and leveling equipment, and a pickling line. The company operates a lithium atmosphere annealing furnace with capacity of 50,000 lb per heat at a maximum temperature of 2000°F. The firm can produce over 5 million lb of cold-rolled strip steel and flat wire a month.



Nialite Goes Nautical

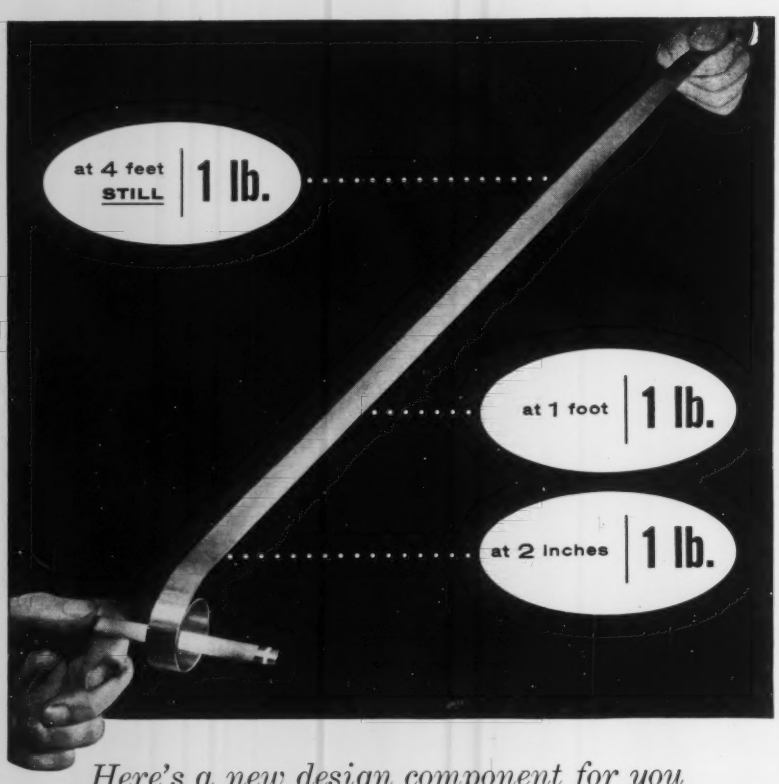
This 21 ft 8 in. propeller was built by Eddystone Division, Baldwin-Lima-Hamilton Corp. for the *S. S. President Adams*. It is made of Nialite, an alloy that is lighter and stronger than those customarily used. The 49,300-lb propeller is expected to save fuel and give longer service than the previous one. Nialite's approximate composition: Cu, 78-80.11%; Al, 9-11.5; Ni, 3-5.5; Fe, 3-5; Mn, 0.82-3.5

Enters Electronics Field

New England Cable Co., a subsidiary of General Cable Co., will build a 25,000 sq-ft addition to its plant in Concord, N. H., at a cost of about $500,000. Electronic products will be produced in it.

Johnson Bronze To Build

Johnson Bronze Co., New Castle, Pa., plans to build a $500,000 research laboratory. The project will permit the producer of sleeve bearings and bushings to double its research facilities. James W. Butler Jr. will supervise a new de-



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- Many other unusual characteristics.

Are *you* ready to learn more about this remarkable new spring element? We're ready to tell you. Just ask for our new bulletin, "The Hunter Neg'ator Spring". This bulletin describes the Neg'ator force characteristics, and its variety of forms and applications. Also included are many "thought provokers" for applying this promising new mechanical element.

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partment, Product Engineering & Development. William Mannella supervises the company's Quality Control Department.

Carpenter Opens Warehouse

Carpenter Steel Co., Reading, Pa., opened a new and larger mill-branch warehouse in Detroit. Managing the operation are Carl O. Ericke, district manager; O. T. Thompson, branch manager; and John S. Stevens, warehouse manager.

Kaiser To Build in Phoenix

Kaiser Aircraft & Electronics Corp. will build a plant in Phoenix, Ariz., which will manufacture electronic systems and equipment. It will be managed by L. M. Shuck, former manager of the firm's Electronics Division, Toledo, O. The company is a subsidiary of Willys Motors Inc., which, in turn, is a subsidiary of Kaiser Industries Corp., New York.

J. Bishop Pushes Expansion

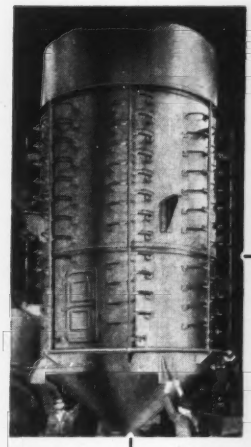
J. Bishop & Co. Platinum Works, Malvern, Pa., is in the midst of a major, long term, multimillion dollar expansion program. It involves complete relocation of several plants and offices. Manufacturing divisions and offices will be centralized at East Whiteland, four miles west of Paoli, Pa.

The plans call for adding 161,920 sq ft of floor space by constructing a two-story building. The stainless steel tube mill facilities for the redrawing of mechanical tubing will occupy the entire first floor of the new building and will include a 9200 sq-ft pickle house. A 50,000-lb draw bench will be installed. The capillary and hypodermic tubing divisions, maintenance, shipping and receiving departments and all general offices will occupy the second floor.

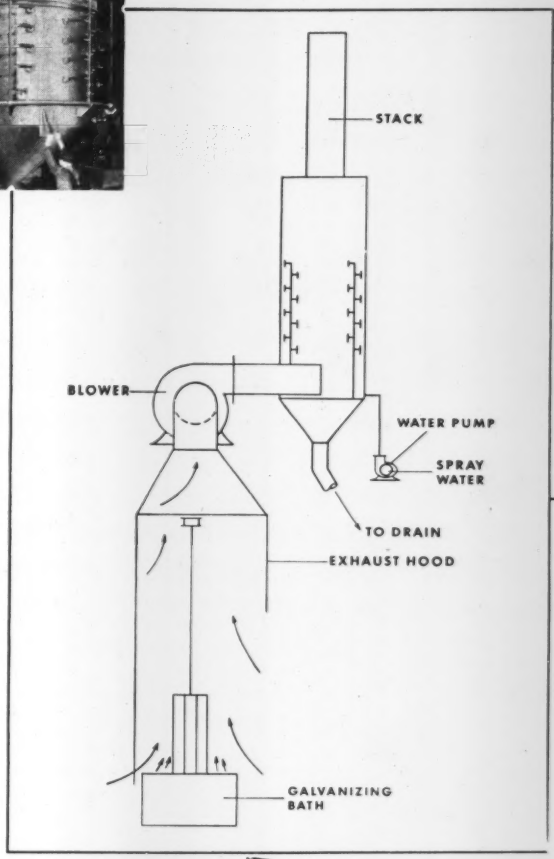
The present tube production building will house the platinum fabricating division, specialties, spinnerettes, machine shop and experimental departments. Relocating the platinum division to the new area will release 11,000 sq ft of area in the present platinum plant in Malvern for increased

AIR CLEANING IN THE PROCESS INDUSTRIES

FUMES FROM LARGE GALVANIZING OPERATION EFFECTIVELY CONTROLLED BY "BUFFALO" HYDRAULIC SCRUBBING TOWERS WITH COLLECTION EFFICIENCY AVERAGING 93%



"Buffalo" Hydraulic Scrubbing Tower



PROBLEM:

Dense, white clouds of corrosive fume were discharged from a large galvanizing operation. Fluxing salts, vaporizing in the molten metal bath, re-condensed in the cool ventilation air to form submicron-size particles. Numerous complaints had been received from neighboring industries because of the irritating nature of the effluent, and the decreased visibility where fumes reached ground level.

SOLUTION:

Two No. 5 "Buffalo" Hydraulic Scrubbing Towers, each with 10,000 cfm capacity, were installed, providing flexibility for both the largest and the smallest galvanizing operations. As shown in the diagram, the exhauster delivers the fumes from the hood tangentially into the Scrubbing Tower, for rotary motion. Special "Buffalo" Nozzles produce a dense, fume-collecting fog. The trapped fume particles travel by gravity to the drain, leaving the cleaned air to aspirate up through the stack with little resistance.

"BUFFALO" HAS THE *PRACTICAL* SOLUTION TO *YOUR* AIR CLEANING PROBLEM. Our full line of cleaning units, years of experience in clearing up every type of "problem" effluent are at your service! Write for details today.

RESULT: Inlet fume concentrations from 5 to 169 grains per 1000 cubic feet reduced to outlet loadings of .6 to 10.7 grains per 1000 cubic feet, averaging 93% efficiency in 8 tests. Spray water consumption is only 3.5 gallons per 1000 cubic feet. Total resistance of Tower plus 20 feet of stack is only 2.25" w.g. Maintenance costs are low, since the Towers are non-clogging, corrosion-resistant and nozzles are easily accessible through external quick-opening latches.

"Buffalo"

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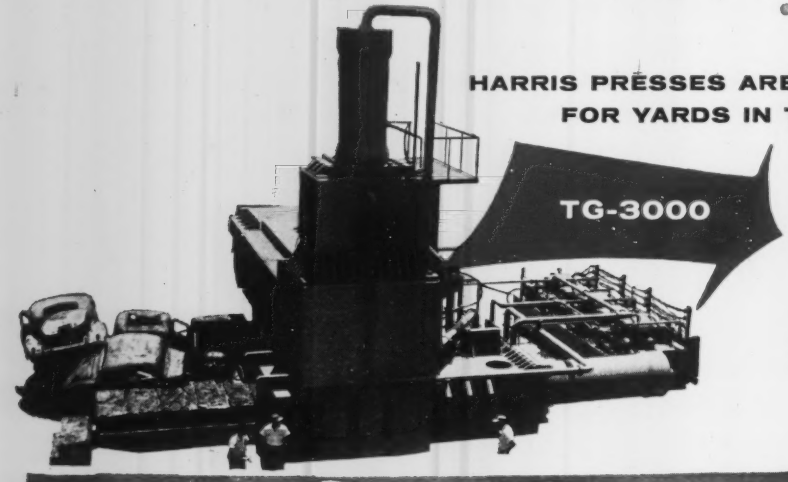
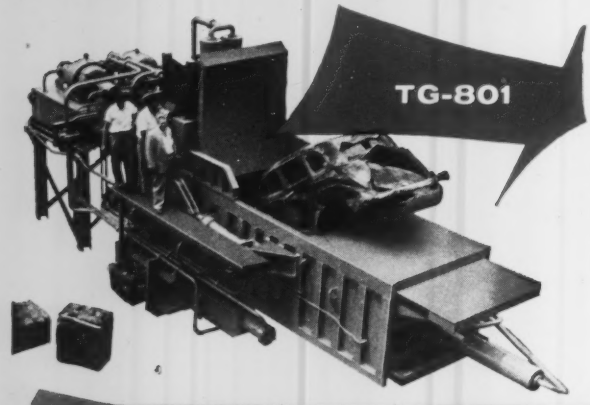


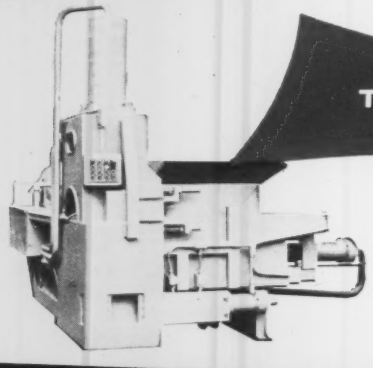
TG-3000

Chicago, Illinois
Louisville, Kentucky
Brooklyn, New York
Morrisville, Pennsylvania
Ashland, Kentucky
Pittsburgh, Pennsylvania
Detroit, Michigan
Davenport, Iowa



TG-801

Springfield, Massachusetts
Los Angeles, California
Jacksonville, Florida
Danbury, Connecticut
Bronx, New York
San Francisco, California
Louisville, Kentucky
Detroit, Michigan
Harrisburg, Pennsylvania
Long Island, New York
Bridgeport, Connecticut
Honolulu, Hawaii
Orlando, Florida
Jackson, Mississippi
Hartford, Connecticut
Seattle, Washington
Augusta, Georgia
Tampa, Florida
Charlotte, North Carolina
Long Beach, California
Houston, Texas
Greenville, South Carolina
San Jose, California



TG-50

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East Chicago, Indiana
Baltimore, Maryland
Los Angeles, California
Chicago, Illinois
Reading, Pennsylvania
Blue Island, Illinois
Winston-Salem, North Carolina

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Union Carbide To Build

Union Carbide Corp., New York, will build a plant near Winfield, W. Va. The basic chemical products plant will be completed in 1960 and will be operated by one of the company's divisions, Union Carbide Chemicals Co.

Olin Mathieson Expanding

Olin Mathieson Chemical Corp., New York, plans a four-year expansion of facilities for developing and producing high-energy solid propellants for rocket engines. New research and development laboratories, pilot plants and test and production facilities will be built at the firm's Ordill Works near Marion, Ill. The company also will expand its development and production of gas generators for auxiliary power units on jet engines and missiles.

Opens Refractories Warehouse

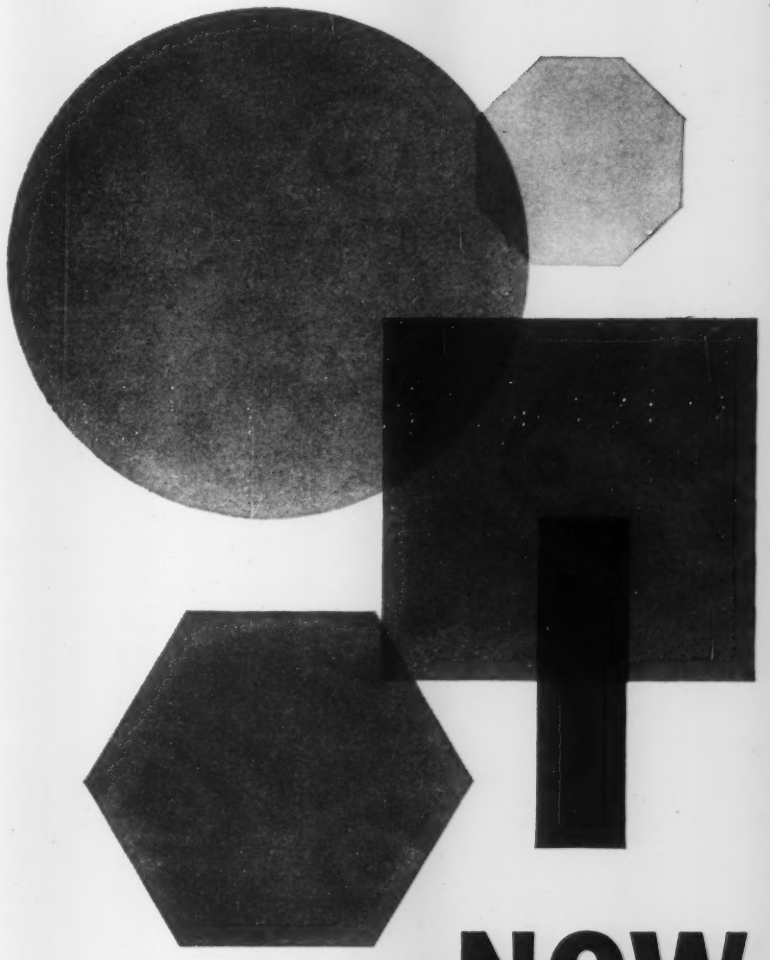
Mexico Refractories Co., Mexico, Mo., established warehouse facilities at 21 S. Conkling St., Baltimore, Md. W. L. Nicholson is manager of the Maryland Division warehouse organization. Dale Bozarth is district sales manager.

Acme Orders Soaking Pits

Acme Steel Co., Riverdale, Ill., awarded a contract for three batteries of soaking pits to Salem-Brosius Inc., Pittsburgh. Acme will use the pits in conjunction with a new melt shop of the oxygen converter type. The complete unit is scheduled to be in production by the fall of 1958.

Carborundum Launches Project

Carborundum Co., Niagara Falls, N. Y., has launched a $3.2 million modernization and expansion program at its three silicon carbide furnace plants in the United States and Canada. Because of more favorable power rates, most of the expansion will be placed in the Shawinigan Falls, Que., plant of Canadian Carborundum Co. Ltd., and in the Vancouver, Wash.,



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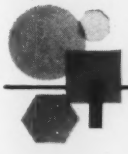

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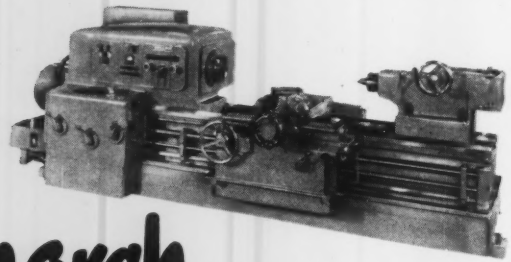
This, and for years it's been thusly, is a cockeyed waste of time! Why should it take so much of your supervisors' time just to check their turning jobs?

You know and we know why—with all the fiddling and figuring it takes to determine and change speeds on conventional lathes, it's almost standard procedure for the operator to pick out one compromise speed no matter what Methods says. So tool life, finish and production fall far below par while rarely is the full horsepower of the machine being used, unless your supervisor spends so much time camping on the job that it hurts his overall supervisory efficiency!

Now see how you check a Monarch Dyna-Shift Job!
A quick look at the *surface cutting* speed dial.
(The operator has dialed his speed with it.) OK.
A practiced glance at, or a fast mike on the diameter. OK. Tool and finish. OK. Next!

Monarch Dyna-Shift Lathes give you the "headstock that thinks" and a host of other exclusive features just as advanced. For better quality; for productivity increased up to 25% and tool life up to 50%; for supervisory time made more valuable to your company—arrange now for a demonstration ... *The Monarch Machine Tool Company, Sidney, Ohio.*



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TURNING MACHINES
ACCURACY • ECONOMY • LONG LIFE
FOR A GOOD TURN FASTER ... TURN TO MONARCH

On the Monarch Dyna-Shift Lathes, you merely dial the desired surface cutting speed—and presto! the machine makes the shift automatically. See them.

plant. Limited expansion is scheduled for the Niagara Falls plant. The project will increase the combined capacity of the three plants about 25 per cent.

Joins Ore Development Project

Vanadium Corp. of America, New York, has signed exploration and drilling arrangements with four companies to extract carnotite ore from the Ambrosia Lake district of New Mexico. The companies: United Western Minerals Co., J. H. Whitney & Co., White Weld & Co., and San Jacinto Petroleum Corp.

Michigan Chemical To Build

Michigan Chemical Corp., St. Louis, Mich., is preparing plans for construction of a sea water magnesium oxide plant. Several sites on the Gulf Coast are being considered.

Thys Co. Opens Branch Office

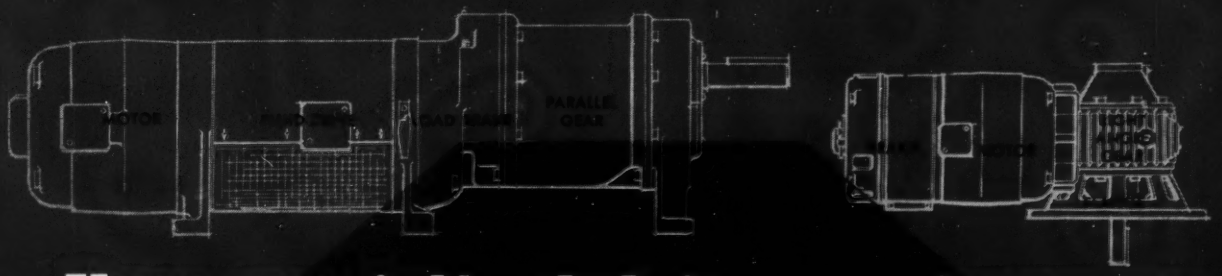
Thys Co., Sacramento, Calif., manufacturer of electric steel castings, opened a sales and engineering office at 414 Hester St., San Leandro, Calif. Thierry Thys is director of sales.

Shaw Licenses More Firms

Shaw Process Development Corp., Port Washington, N. Y., licensed these firms to use its process of precision investment casting: Kuhlman Diecasting Co., Kansas City, Mo.; Permanent Mold Die Co. Inc., Hazel Park, Mich.; and Manco Products Inc., Melvindale, Mich.

Texas Foundry Expanding

Texas Electric Steel Casting Co., Houston, has launched a major expansion program, involving the installation of an electric furnace and construction of additional plant buildings. Delivery of the furnace, built by Whiting Corp., Harvey, Ill., is expected about Sept. 1. It will have a capacity of 4 tons. With it, the company will be able to pour as much as 13 tons of molten steel at one time for castings. The building program will add about 20,000 sq



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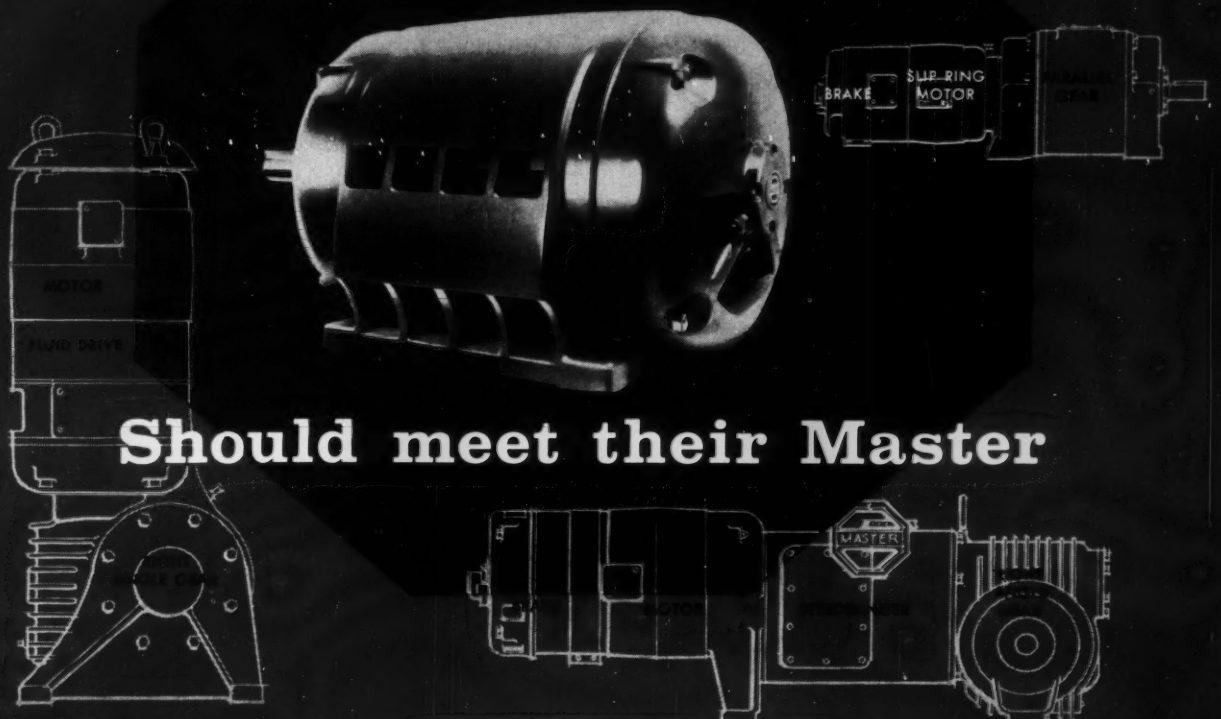

Should meet their Master

Master Units Combine into Engineered, Customized Package Drives—Providing the Right Shaft Speed, the Right Construction Features, the Right Mounting. Why Put Up With Makeshift Assemblies?

Engineers and Manufacturers of

Electric Motors	**⅛ to 400 H.P.**
Gearmotors	**⅛ to 125 H.P.**
Variable Speed Drives	**⅛ to 30 H.P.**
Unibrake Motors	**⅛ to 150 H.P.**
Fluid Drive Motors	**½ to 15 H.P.**

Alternating current motors, direct current motors, generators . . . open, enclosed, explosion proof . . . with 5 types of gear reducers . . . with electric brakes . . . with mechanical or electronic variable speed units . . . with fluid drives . . . Master has them all and so can be completely impartial in helping to select the one best drive for you.

MASTER ELECTRIC MOTORS

THE MASTER ELECTRIC COMPANY, Dayton 1, Ohio

Bright Annealing?
Normalizing?
Nitriding?
Spheroidizing?

You can't beat

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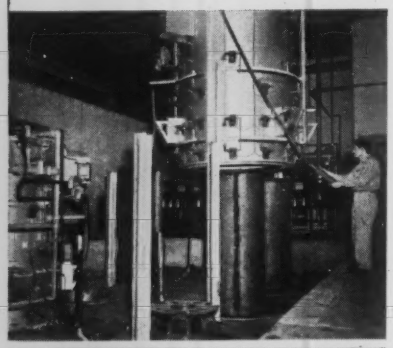

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Faster and More Uniform Heating Rate
Extra large volume of recirculating atmosphere.

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Versatility
Can be used for bright annealing, normalizing, nitriding, or spheroidizing coiled wire or strip—ferrous or nonferrous.

High Efficiency
No radiant tubes.

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Full particulars and recommendation for any job on request.

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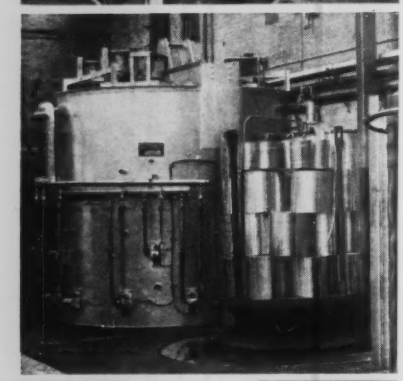
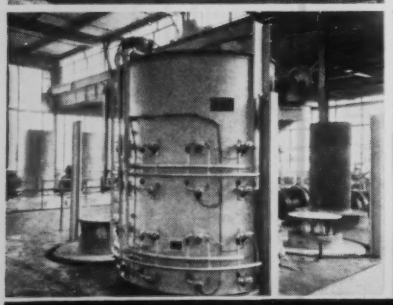
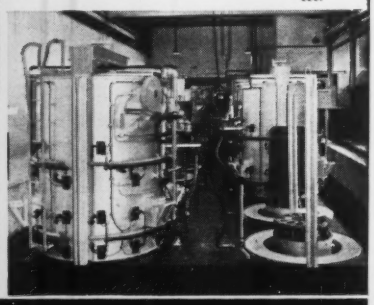






Over One-Third of a Century of Progress in
FURNACES · PRODUCTION LINES · SPECIAL MACHINES · COMPLETE PLANTS

CONTINENTAL INDUSTRIAL ENGINEERS, INC.
176 West Adams Street, Chicago 3, Illinois

ft to the plant. Pressure castings are among the company's principal products.

Will Use Cold Flowing Process

Claude C. Slate Co., Glendale, Calif., licensed Thompson Products Inc., Cleveland, to produce parts by a new process: Metals are cold flowed into tubular forms of all sizes and shapes. The process eliminates machining, burring, polishing and honing and produces practically no scrap, Slate officials say.

CONSOLIDATIONS

Jones & Laughlin Steel Corp., Pittsburgh, purchased **Cold Metal Products Co.**, Youngstown, subject to approval by stockholders. The Cold Metal operations will become the Strip Steel Division and will be managed from the present Cold Metal executive offices in Youngstown. Charles M. Beeghly, vice president and general manager of Cold Metal, will become president of the Strip Steel Division.

Acquisition of Cold Metal Products Co. marks the entrance of J&L into the cold-rolled strip steel market. It gives J&L two specialty metal warehouses: Kenilworth Steel Co., Kenilworth, N. J., and Cold Metal Products Co. of California, Los Angeles. Though these are primarily warehouse operations, they also have facilities for limited production of cold-rolled strip.

Cerro de Pasco Corp., New York, acquired **Lewin-Mathes Co.**, St. Louis, manufacturer of copper and brass tubing, pipes and rods. The Lewin-Mathes plant is at Monsanto, Ill. Production ranges from secondary smelting and refining of nonferrous metals through the manufacture of finished products. At present operating rates, the firm requires some 50 million lb of copper annually, together with lesser amounts of zinc and lead. Projected production requirements, assuming full utilization of the firm's facilities, point to potential plant consumption of about 90 million lb of copper, 20 million lb of zinc and 4 million lb of lead a year. The prop-

erty will be operated under the name of Lewin-Mathes Co. Division of Cerro de Pasco Corp.

Subject to ratification by Dobeckmun stockholders, **Dow Chemical Co.**, Midland, Mich., and **Dobeckmun Co.**, Cleveland, will merge. Dobeckmun, maker of flexible packaging and metallic yarns, has plants in Bennington and Wells River, Vt.; Berkeley, Calif., and Cleveland. Dow, producer of basic chemicals, agricultural chemicals, plastics and magnesium, operates plants in nine states and in Canada and has facilities under construction in two other states.

Miniature Precision Bearings Inc., Keene, N. H., acquired **Split Ballbearing Corp.**, Lebanon, N. H.

Boice Gages Inc., Hyde Park, N. Y., purchased **Nilsson Gage Co. Inc.**, Poughkeepsie, N. Y. The firm will be operated as the Nilsson Gage Products Inc., a division of Boice Gages.

NEW ADDRESSES

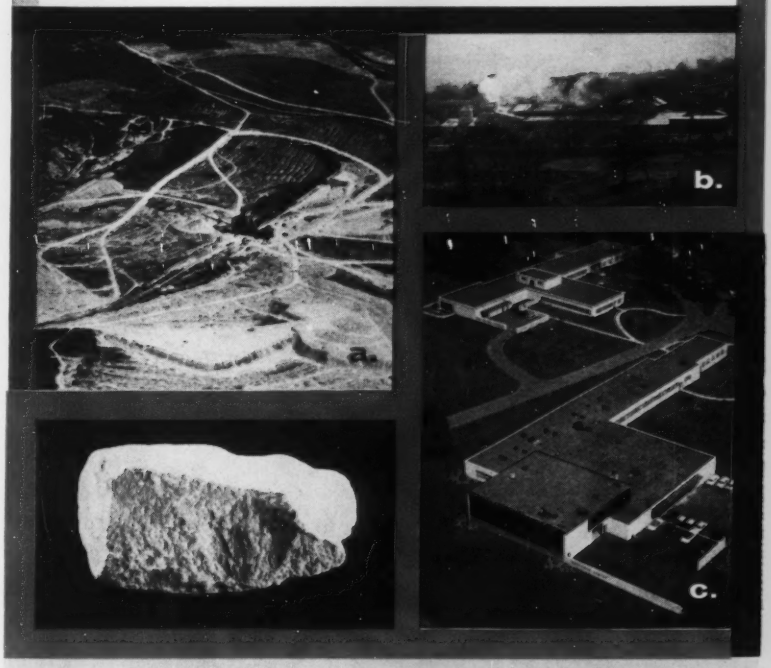
Aluminum Window Manufacturers Association established its own offices at 45 North Station Plaza, Great Neck, N. Y. J. P. Jansson is executive vice president; E. F. Kelly, administrative secretary. Herbert S. Blake Jr., association counsel, will continue practice at the former AWMA address, 75 West St., New York.

ASSOCIATIONS

J. E. Brinckerhoff, vice president of Babcock & Wilcox Co., New York, was elected president of the **Refractories Institute**, Pittsburgh. Avery C. Newton is executive secretary.

Alloy Casting Institute, Mineola, N. Y., elected these officers: President, F. M. Fahrenwald, Fahralloy Co., Harvey, Ill.; vice president, P. L. McCulloch Jr., Electro-Alloys Division, American Brake Shoe Co., Elyria, O.; E. A. Schoefer, executive vice president and treasurer.

Chemstone **earns** its place as your **fluxstone** supplier



Steel is *big* . . . and suppliers of commodities to steel must be big, too. Chemstone's operations meet these requirements from three all-important standpoints:

a. **THREE QUARRIES**—the one shown above is 3,000 acres of purest limestone strata.

b. **PLANTS**—Strategically-located, high-capacity, modern facilities . . . an integrated plant-rail-dock-boat network . . . the kind of operation you can count on for fast, sure, on-schedule deliveries.

c. **RESEARCH CENTER**—where unceasing work goes on in the metallurgical application of fluxing limestones.

Chemstone—and its parent company—Minerals & Chemicals Corporation of America is geared to give steelmakers full service. We invite your inquiry.

WORLD'S LARGEST NON-CAPTIVE FLUXSTONE PRODUCER

Chemstone CORPORATION

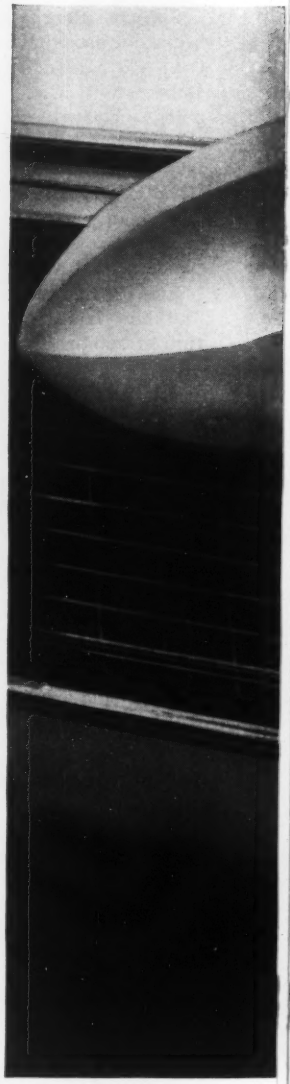
LEADER BUILDING, CLEVELAND 14, OHIO

a subsidiary of
MINERALS & CHEMICALS CORPORATION OF AMERICA

Pittsburgh, Pa. Representative:
NEVILLE LIME COMPANY
Oliver Building

For whatever you fabricate . . .

N-A-X FINEGRAIN STEEL COMBINES STRENGTH WITH FORMABILITY



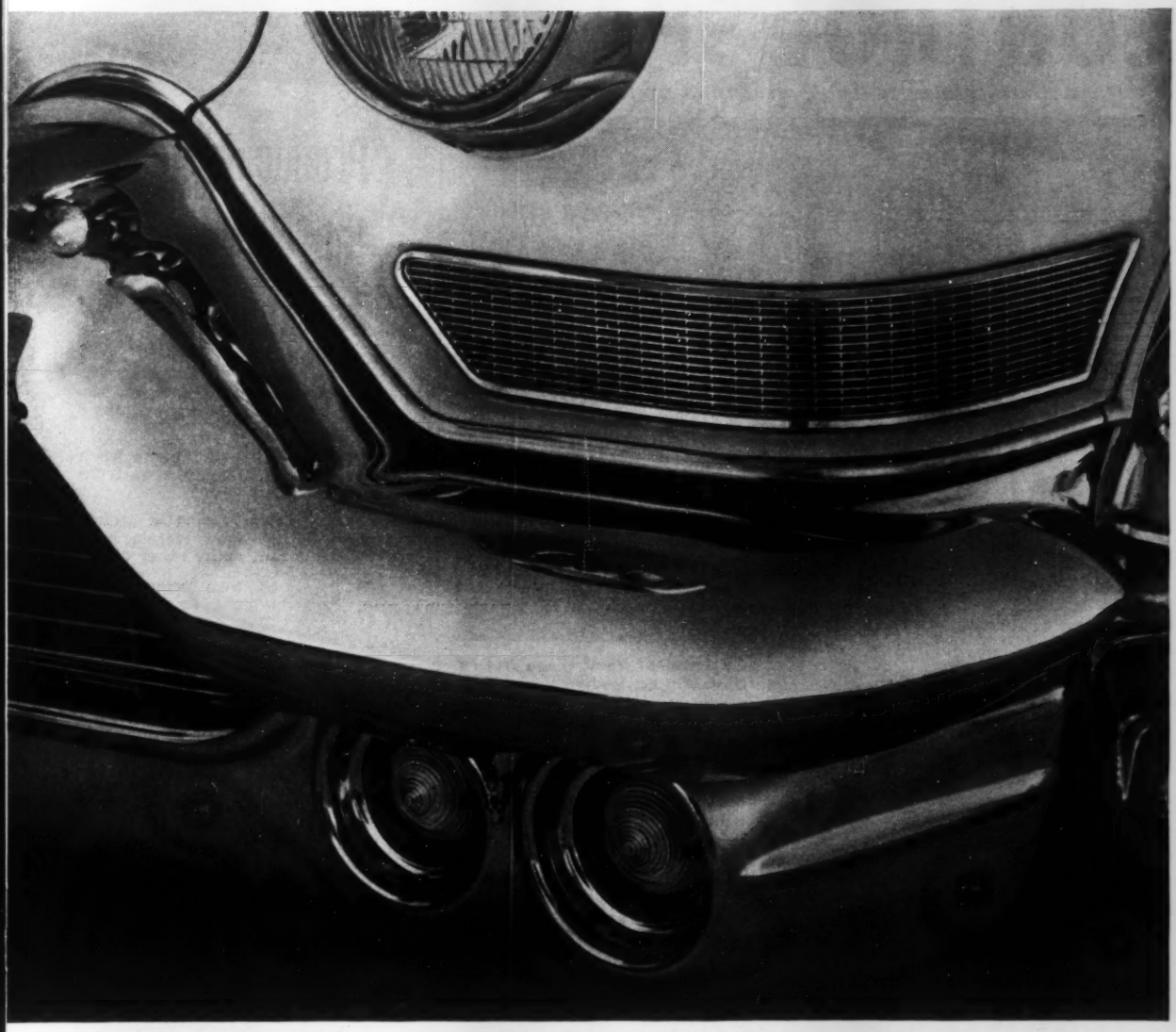
Among the many economical advantages of N-A-X FINEGRAIN—a low-alloy, high-strength steel with widely diversified applications in modern metals design—is its combination of great strength with excellent formability. Even at the higher strength levels (50% greater than mild carbon steel) N-A-X FINEGRAIN can be cold formed and drawn into difficult stampings and cold formed shapes.

Take these qualities and add the ability of N-A-X FINEGRAIN to be readily polished to a high luster at minimum cost, and when plated, you have a steel ideally suited for such applications as bumpers, bumper guards, and many others where strength and toughness with good finish is important.

Engineers and designers like N-A-X FINEGRAIN especially because its physical properties are inherent in the "as rolled" condition. No subsequent treatment is needed to insure its characteristics.

Check these other important advantages: N-A-X FINEGRAIN steel, compared with carbon steel, is 50% stronger • has high fatigue life with great toughness • is stable against aging • has greater resistance to wear and abrasion • is readily welded by any process • offers greater paint adhesion. NOTE: Where greater resistance to atmospheric corrosion is an important factor, our N-A-X HIGH-TENSILE steel is recommended.

For whatever you fabricate, from bumpers to bulldozers, with N-A-X HIGH-STRENGTH steels you can design longer life, or less weight, and economy into your products. Let us show you how.



One of many applications where N-A-X FINEGRAIN'S strength with formability saves production money.

N·A·X
HIGH-STRENGTH STEELS

N-A-X Alloy Division, Dept. B-4

GREAT LAKES STEEL CORPORATION

Detroit 29, Michigan • Division of

NATIONAL STEEL CORPORATION

N-A-X Alloy Div., Dept. B-4
Great Lakes Steel Corp., Detroit 29, Mich.

☐ Please send me technical data on N-A-X FINEGRAIN steel.
☐ Please have your representative contact me.

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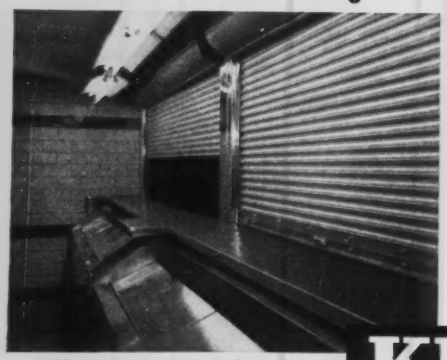
Kinnear Steel Rolling Grilles
CONTROL SPACE

without blocking light, air, sound or vision

Coils Out of View When Not in Use! Artistic, modern beauty and great strength *plus space-saving convenience!* Kinnear Rolling Grilles are ideal for "space control" — closing off corridors, bays, or other room areas. Curtain of heavy round bars locked in rugged steel links defies burglars, trespassers, vandals. Coils upward, stays out of view until closed and locked. Heavily galvanized for lasting beauty (aluminum or bronze also available). For face-of-wall or under-lintel mounting. Any size. Manual or motor control. Send for full information.

KINNEAR Rolling Counter Shutters Also Provide Space-Saving Protection



The counter shutter that coils upward, completely out of the way! Protects with a rugged all-metal curtain when lowered. Made like the famous Kinnear Steel Rolling Doors used so widely in service openings of all types, but with a curtain of one of Kinnear's "midget" slats. For all counter openings up to 20′ wide. Steel, aluminum, bronze, or stainless steel. Write for details.

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KINNEAR ROLLING DOORS
Saving Ways in Doorways

Get Set for Metalworking's Fabulous Future . . .

Producing for the New Technology

NOW is the time to get in on the ground floor of metalworking's fabulous future.

BECAUSE it will take time to learn how to produce for the new technology ahead.

OPPORTUNITIES abound in atomic energy, missiles, new metals, miniaturization and many other areas.

LEARN how to turn science into profit, get the jump on your competition . . .

READ the seventh installment (Aug. 12) of STEEL's 1957 Program for Management.

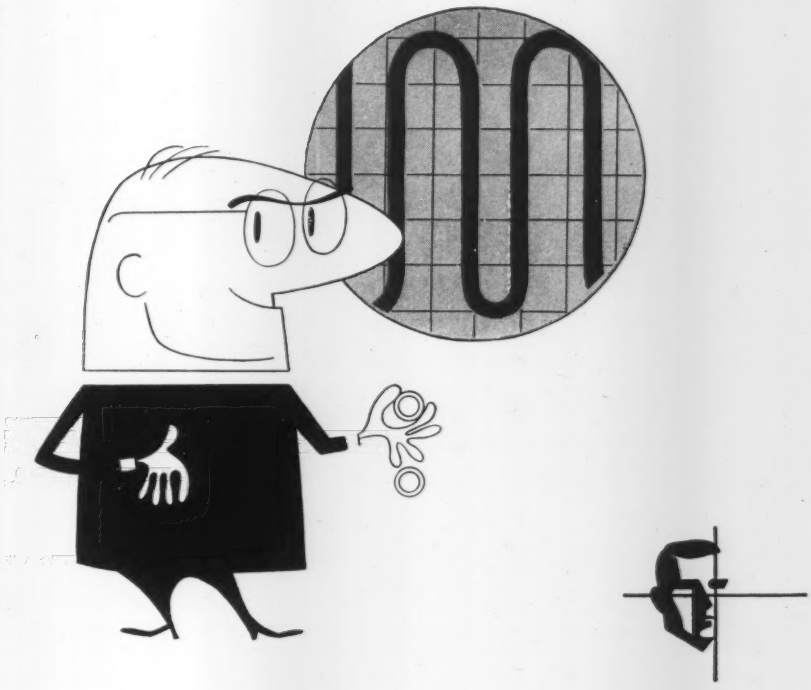
IT will give you expert counsel on:

- How you can make products for the new technology.
- How you can determine which areas are best suited for your company.
- How you can keep up with new developments that can mean new business for you.

Articles published to date:

1. **The Care and Feeding of the Junior Executive**
   (Feb. 11, page 93)
2. **Grooming Middle Managers**
   (Mar. 18, page 93)
3. **Profit Sharing**
   (Apr. 15, page 115)
4. **Inventory Management**
   (May 13, page 109)
5. **Managing Our Markets**
   (June 17, page 93)
6. **Research: Threshold to the Future**
   (July 15, page 93)

Extra personal copies of these Program for Management articles are available until the supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.



Research . . . Threshold to the Future

RESEARCH and development have made many a company what it is today, but look for R&D to become even bigger guns in your arsenal of competitive weapons. A company can thrive on one good product today. It'll take a series of strong ones to cash in on metalworking's fabulous future.

The handwriting is on the wall: Next year, every metalworking company will compete against at least one product that does not exist today. As much as 80 per cent of industry's growth in the next three years will come from products not now produced.

Although research deals in futures, the "nowness" of the problem cannot be overemphasized. Right now, your competitors are working on products they'll introduce two to ten years hence.

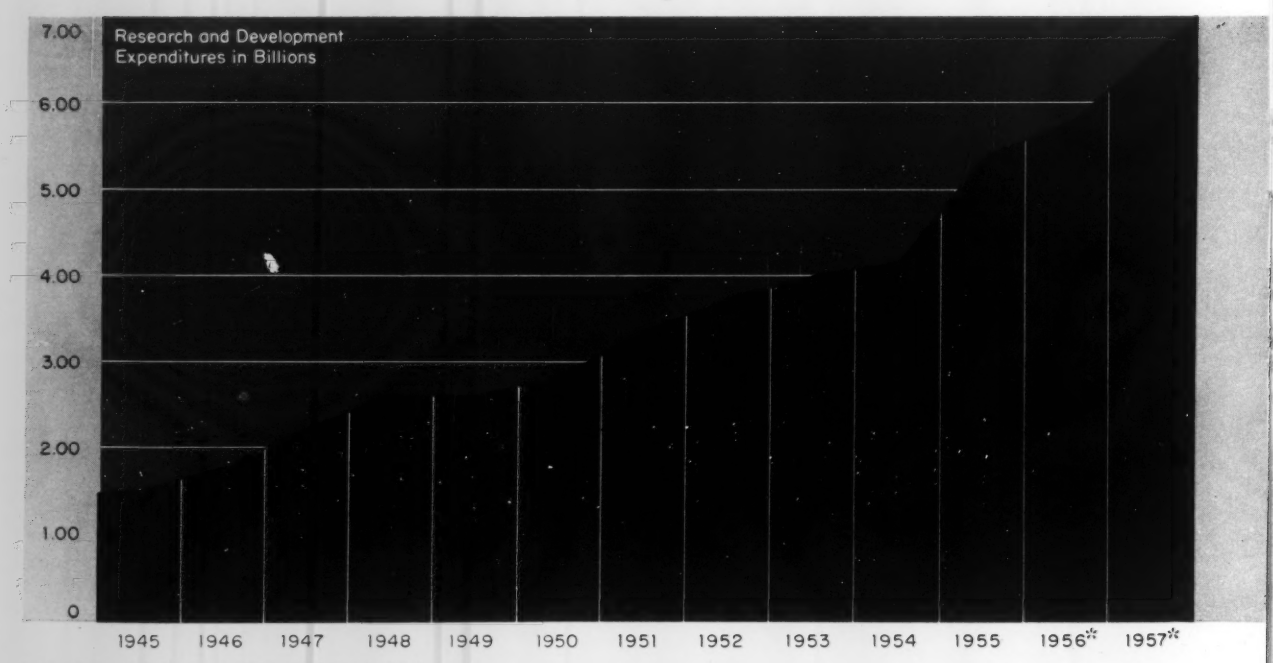
The implications of the situation are spelled out by J. Earl Gulick, vice president of manufacturing, B. F. Goodrich Co., Akron: "Nothing can destroy a business so completely as a new and better product in the hands of a competitor."

As Mr. Gulick suggests, the best defense will be an aggressive offense.

Example—In the early 1940s, Polaroid Corp., Cambridge, Mass., started working on its Land camera —the one that takes a picture and turns out a print in 1 minute.

The year the camera was introduced (1948), Polaroid had net sales of $1.5 million, but after taxes and expenses, it came up with a loss of $865,000. In 1956, the company had net sales of $34.5 million and a net profit of $3.7 million. In the eight-year period, sales and profits gained steadily. J. H. Booth, executive vice president, credits the growth almost solely to market acceptance of the new camera.

He points out that the one new idea has been a breeder for more new products. "We have just introduced a camera that produces a transparency rather than a print. It can be shown on a projector 2 minutes after the picture is taken. Then, too, we still have not touched



Source: Research & Development Board, Department of Defense.
*STEEL estimates.

the low-priced camera market, but we will. We also intend to take advantage of the current interest in color by adapting our process for it."

Managers of publicly owned companies will be interested in what happened to Polaroid stock after the introduction of the Land camera. In 1951 it sold for 24½. Today it's selling for about 190.

More Examples—Here's additional proof of what new products have done for sales in the postwar period.

Crawford H. Greenewalt, president of Du Pont, says about 27 per cent of his company's sales result from products developed in the postwar period.

A third of Minnesota Mining & Mfg. Co.'s 1956 sales came from products developed since 1945. Corning Glass Works's president, W. C. Decker, figures half of current dollar sales come from products that didn't exist in 1946. Westinghouse says that 60 per cent of its 1956 sales came from postwar products.

Fully 80 per cent of RCA's current business comes from products and services not on the market ten years ago. Most electronics firms are confident that this process will repeat itself in another ten years.

Size Isn't the Key

With the exception of Polaroid (it employs 1200), those examples involve large corporations with widely recognized research activities. Many executives of smaller companies cite parallel growth patterns.

In 1953, of the 15,500 companies that researched in their own facilities, the 300 largest (more than 5000 employees) accounted for 70 per cent of the R&D money spent. But 80 per cent of 15,500 doing research employed fewer than 500. About 3700 other companies without R&D programs of their own supported projects being done by outside organizations. Many were small companies.

The point is this: Size is not a factor if R&D are well managed. It means you must:

Research for Profit

Listen to R. E. Knight, vice president-director of research and development, Kaiser Aluminum & Chemical Corp., Oakland, Calif.: "Research success is directly proportional to the degree to which it is integrated into the business."

That job, which is strictly the role of top management, is the foundation successful programs are built on. The tie-in has two facets: You should link your research to company plans and goals and coordinate your various research efforts.

Direction—Robert S. Ingersoll, president, Borg-Warner Corp., Chicago, says: "It seems to us that the first obvious step in planning for research, but one frequently overlooked by top management, is the establishment of over-all company objectives and the dissemination of information about these objectives throughout the various levels of management."

At least three benefits result: First, by getting goals down on paper, management at all levels is forced to refine forward thinking. Second, knowing what the goals are, idea men will be working in a direction that will bring most profit to the company. Third, definition gives a concrete assist to R&D workers on the job.

Dr. Clifford Rassweiler, vice chairman, Johns-Manville Corp., explains the last point: "Setting worthwhile objectives and explaining why they are worthwhile is one of the greatest aids to laboratory morale. Everybody wants to feel that he is working on something important and that what he

The Big Boom . . .

• Since 1945, the average annual growth in research expenditures has been 14 per cent. During this period, outlays for R&D in the U.S. add up to $46.7 billion. That's easily more money than was spent in the previous 169 years of our history.

Industry generally contributes about 45 per cent of the money, but it uses 65 to 75 per cent of it. The government is the other large contributor.

is trying to produce will be used if his activities are successful."

Use Task Force Approach

That's only part of the integration story. You also should form a working team of people from research and development and such activities as production, marketing and engineering. The odds on a new product's success are always enhanced by a meeting of many minds. More than that, research needs to know the thinking of other departments if the product is to be a commercial hit.

Bennett Archambault, president, Stewart-Warner, says: "Unless the product to be developed can be manufactured at a cost which is fully competitive, either with similar products in the field or with dissimilar products which it is intended to displace, and unless there is a practical means of promoting and selling the product if and when it is developed, there obviously is no value in undertaking the technical effort."

Positions on Team—Have your production experts work out: 1. Can we make it? 2. What will it cost to make it? 3. How fast can we make it? 4. With slight changes, could it be made easier, cheaper? 5. If we can't make it, how much would it cost to set up a production system that could handle it?

Sales and marketing people, of course, are expected to interpret the development in terms of customer needs, likes and dislikes. Dr. Rassweiller sums it up this way: "I don't believe the people inside a research organization are qualified to set objectives without considerable help from both sales and production."

The end goal is to come up with a development that can be made at a reasonable cost, sold at a reasonable profit to a market big enough to justify the gamble. Unless you use all the company know-how, you're not taking advantage of all the odds you can muster.

Example—At Micromatic Hone Corp., Detroit, a new products committee operates under D. T. Peden, vice president in charge of the research and experimental program. It includes: The executive vice president, the vice president and assistant general manager, the vice president and executive engineer, the administrative vice president and the chief engineer. Associate members are: The sales manager, abrasive manager and patent lawyer.

Mr. Peden states the committee's job this way: "It sets new product goals and defines their priority."

The rest of the research administration is left to Mr. Peden. He reports directly to top management. The Micromatic budget is based solely on need. President Kirke W. Connor says the sky's the limit "after we've established the worth of a project."

An operation like this is a must in industrial research. It puts final control of R&D with top management; it also provides for cross-fertilization of ideas.

How To Run It—Set up the committee for regular meetings. Get regular reports on all projects so you can keep track of progress. At Borg-Warner, every project is reviewed quarterly. Stewart-Warner division committees (consisting of heads of engineering, manufacturing and sales, plus the division general manager and any others he may want to appoint) meet at least once each six weeks. Detailed minutes are sent to all division managers, and the corporation president. This, Mr. Archambault says, provides cross-fertilization of ideas, encourages divisional competition and prevents two divisions from working on the same project.

Coupled with the definition of company goals and objectives, a regular playback on progress completes a two-way circuit in communications.

Management's role does not stop

What Your Competition Is Spending

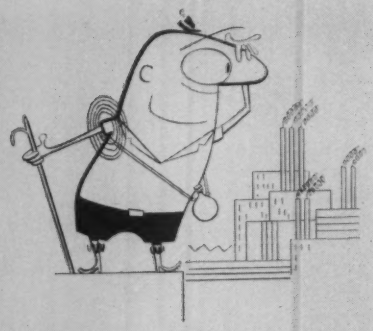
You can get a pretty good idea from what your industry is doing. Based on a percentage of sales, these figures are approximations for 1955:

	Per Cent
Aircraft	13.0
Chemicals	3.3
Electrical Machinery	6.9
Professional & Scientific Instruments	6.0
Machinery	3.1
Motor Vehicles	1.7
Petroleum Refining	0.7
Primary & Fabricated Metals	0.8
Radio & TV	6.4

Source: Foster D. Snell Inc.

SIX STEPS IN PRODUCT EVOLUTION

1. Exploration

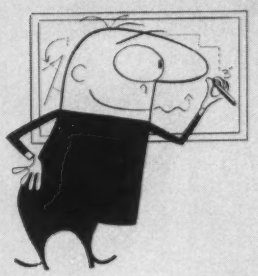


- **Set company goals and tell employees what they are.**
- **Organize idea generation using brainstorming, product conferences, suggestion boxes, etc.**
- **Collect ideas through established network.**

2. Screening

- **Expand each idea into a full product concept.**
- **Collect commercial facts and opinions about the product.**
- **Select ideas that promise the most profit.**

3. Specification



- **Appoint a team to study accepted ideas.**
- **Determine desirable product features, market potential, manufacturing feasibility.**
- **Draw up specs, also priority and time-cost development budget.**

Source: Booz, Allen & Hamilton.

here. A properly directed campaign calls for a keen grasp of fundamentals. It means you must:

Build on Bedrock

Most companies have relatively little trouble with product development, production and sales. The men are separated from the boys in the preliminary stages. Booz, Allen & Hamilton (see exhibit, above) calls them: Idea exploring, screening and specifying.

Timing, of course, is a problem: The secret of success is to be working on the right idea at the right time, but that is oversimplification. Getting the "right idea" is the real fly in the ointment.

Putting it another way: The big trouble comes in knowing which of your ideas are the most practical and, among them, which will make the most money for the company.

Finding Out—Mr. Ingersoll advises: "Marketing research is the important management tool which is used to determine as much as possible in advance whether a particular product research program is feasible."

In the long run, the most successful R&D programs are the ones that anticipate customer needs or wants. Dr. Rassweiler puts it this way: "The commercial objective almost always is to increase sales or to increase profit margins by supplying something which has greater salability. The important point is that the definition of what is needed to achieve this greater salability must be in terms of customer needs, customer preferences."

In some businesses, determining customer requirements is tough. With a new consumer product like, say home workshop tools, the only practical system may be to check as many prospects as possible, then hope they speak for the market.

If you make something like special machine tools, customer reaction is automatically part of the business. The new products are born out of a customer need.

Out of your market analysis you should get at least these three things: 1. What should the product do? 2. Who will buy it? 3. How big will sales be?

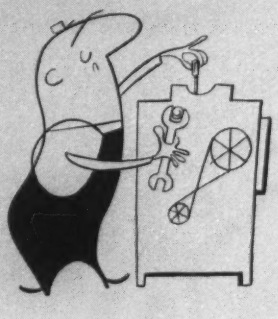
You won't, of course, get any of the answers with the precision that you'd like, but you'll get a feel of the market that you need to figure the odds on development.

Budget Realistically

You can't reduce this problem to an easy formula. Most executives consider many factors before they arrive at an R&D appropriation. A 200-company survey by the National Science Foundation finds that management looks at these things:

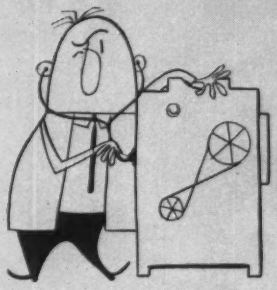
Company resources, including personnel, ideas, research facilities and available capital; immediate company needs, including production problems or customer preferences that call for process or product improvement or for new products; company aspirations for expansion or steady growth; nature

4. Development



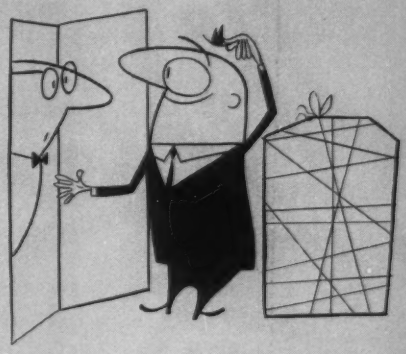
- **Set up development projects for each product.**
- **Build product to specifications.**
- **Evaluate it in the lab, release for further testing.**

5. Testing



- **Conduct in-use, production and market tests.**
- **Make final revisions, product decisions.**
- **Freeze design.**

6.Commercialization



- **Complete plans for production and marketing.**
- **Co-ordinate production and marketing programs.**
- **Check results. Make necessary last-minute changes.**

of the company's products or processes and the degree of their dependence on scientific information and technology; management attitudes toward research; environmental factors, such as the business outlook, nature of competition, availability of resources, including manpower, capital and basic research findings, the research policies of the government and the expected size of its future research contracts.

The survey also showed that competition is a major factor, sometimes the overriding one. Many spend what they think they need to keep up with, or ahead of, competitors (see table, page 95).

Gages—Despite the obvious desirability of a formula for the optimum R&D investment, more than half the companies in this survey said their expenditures are determined wholly by appraisals of company needs and resources.

Among companies that gave some consideration to a fixed ratio or formula, only a handful seemed to rely heavily on such standards.

No. 1 Formula—The most common is the ratio of research costs to sales. Stewart-Warner Corp., Chicago, does it this way: Each of nine corporate divisions is charged a percentage of sales for research and development, whether it's spent or not. Any balance at the end of a year is transferred to a general corporate reserve.

Mr. Archambault says: "We established these . . . as percentages of sales rather than as fixed dollar figures, both for simplicity in product costing (R&D charges are used in establishing selling prices) and to provide a means of control related directly to future divisional operating levels." The current S-W budget is 4 to 5 per cent of sales.

No. 1 Defect—The basic danger in assigning costs as a percentage of sales is that it ties the R&D wagon to what might be a bucking horse. A slump in sales could unseat a promising development project. S-W has a corporate reserve fund which conceivably could be used to continue a division project during a sales dip.

The reserve, which now consists of unspent allocations, plus transferred funds from another reserve, is "to provide against future new product development costs." Mr. Archambault continues: "We intend to use these funds principally on long range projects which are not related directly to our present fields of operation. Since full federal income taxes have been paid on these reserves, they have, in effect, more than twice their stated value in terms of future, tax deductible expenditures."

Other Formulas — Some people use different bases, including sales, profits, capital assets, invested and available capital.

One company starts by figuring the average cost per man for his professional R&D staff. (National Science Foundation says the U.S. average was $27,000 a year in 1953.) The sum is doubled to allow for supporting staff and overhead. An estimate of the size of profes-

sional staff needed is based upon an analysis of research needs.

Safe Ground Defined—The budget comes down to a compromise between what you think you can afford to spend and what you think you must spend. It means you have to provide for two factors: You must spend enough to research at a competitive rate. You must provide for a continuing investment, regardless of business fluctuations.

R. B. Semple, president, Wyandotte Chemicals Corp., Wyandotte, Mich., says: "In research, more than anywhere else, continuity and time are needed to get results. One cannot turn a research budget on and off like a faucet."

Hand-Pick Your Top Man

C. C. Furnas, in his book, *Research in Industry* (D. Van Nostrand Co. Inc.), says: "The research director's job is the most important one of all the technical positions in a company, and without danger of overemphasis, one of the most important in the entire executive family, when the long-term success of a company is considered."

What kind of man should he be? Mr. Ingersoll says: "We believe that the man who is responsible in a staff capacity for overseeing the research programs of our divisions and in a line capacity for the operation of our central research activities should be a businessman as well as a man who understands today's technology."

He may not be, and often isn't, the best scientist or engineer in the R&D group. But he is a leader who knows enough about development to make decisions about present and future projects. Part of his job, according to A. C. Hall, general manager, Bendix Research Laboratory, is to see to it that the problem formulated is one that can be solved.

- He is capable of dealing with (and he reports directly to) top management.
- He is capable of directing scientists and engineers without dictating to them.
- He can evaluate an idea and know something of what it will cost to develop and how long it will take.
- He is qualified to evaluate his staff, to motivate it, and he has the authority to see that it is adequately compensated.
- He is a businessman, thoroughly familiar with the company policy and goals.

Finally, he has the background to enable him to make two critical decisions.

First, of all the projects in the hopper, which is the best gamble and should be started first?

Second, as J. F. Weiffenbach,

New Products and Profits

• The company that brings out a successful product gets a handsome return after introduction. Profits and sales climb. Sales continue to mount even when production begins to catch demand, or when competitors begin to win some of the battles and profitless price competition sets in, but profits slump.

Test the Product Idea . . .

• Here's what management at Denison Engineering Division, American Brake Shoe Corp., Columbus, O., did when they decided to design and engineer a low priced, low tonnage hydraulic press. Before engineers went to work, sales representatives made a simple market analysis, taking questionnaires to about 200 prospects.

Management learned what general features customers wanted and about what they'd be willing to pay. By taking advantage of the information, the company is selling the press at the rate of 1500 a year.

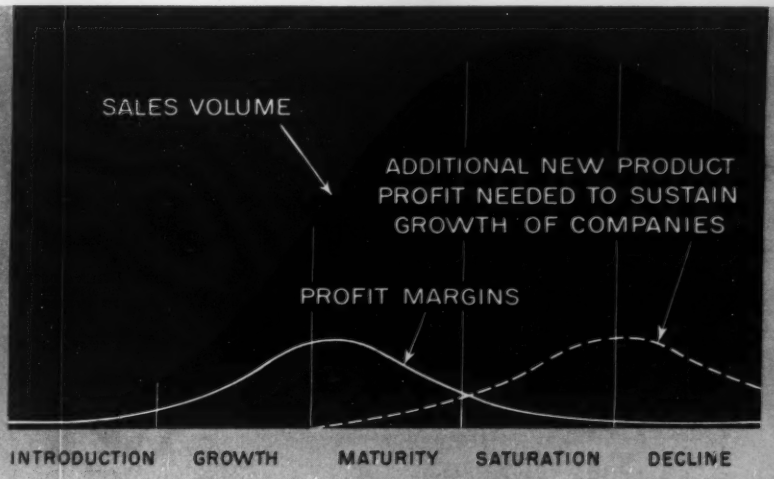
Here's how specifications coincide with survey results:

Features	Customers Wanted	They Got
Tonnage	**1 ton**	**1 ton**
Daylight	**8 in.**	**8 in.**
Stroke	**2 in.**	**3 in.**
Throat Depth	**4 in.**	**4 in.**
Ram Speeds	**80 to 100 strokes a minute**	**150 strokes a minute**
Ram Action	**Manual**	**Manual**
Nonrotating Ram	**Yes**	**Yes**
Bolster	**U-slot**	**U-slot**
Bed Dimensions	**8 x 10 in.**	**7⅜ x 10 in.**
Cost	**$300**	**$395**

Drawn on a life cycle chart, the curves dramatize two facts:

1. **It takes a continuing flow of new products to sustain over-all profit margins.**
2. **The company that makes a killing is the one that introduces and successfully markets the product, then feasts on its growth, not the one that "jumps on the band wagon" in time to be caught in the profit decline.**

Source: Booz, Allen & Hamilton.



Borg-Warner's corporate director of research, says: "Part of his problem is to know when to quit—when is a project finished? Also when do you stop work on an uncompleted project?" Here, his job is like playing stud poker. It costs him more for every additional card he draws. The smart research manager, like the smart poker player, is the one who can tell by looking at his first cards whether he should stay in the game.

Put Emphasis on Practical

Few companies have anything to do with pure research—only 4 to 5 per cent of all R&D money is so used. The rest goes for applied research and product development.

Companies invest in research to make a profit. The faster the payoff, the better. Pure research is shunned because the reward is nearly always an unknown, or at least remote. This disturbs many industrialists, scientists and educators.

In making a plea for industry-backed pure research, Dr. John T. Rettaliata, president, Illinois Institute of Technology, Chicago, says: "Applied research has obviously benefited the nation, but at the same time it has jeopardized the nation's potential for further achievement by depleting our stockpile of existing knowledge. We have been living off the fat of prior discovery. Further prosperity demands that our reserves of knowledge be replenished, lest we become unable to supply the components necessary for continued advancement in applied research."

Lawrence R. Hafsted, vice president in charge of research staff, General Motors Corp., agrees with Dr. Rettaliata. He says: "I think the main thing is this: We must all recognize that however successful industrial research is, we still depend for our progress on basic research."

If you want to branch out into pure research, here is a suggested approach: Contribute to or conduct programs through nonprofit institutions and professional research agencies.

Don't Forget Outside Help

Obviously, you may run into problems you can't crack because you haven't got the necessary research manpower or facilities—a situation often confronting small business. A host of nonprofit institutions and professional research centers do such work on a contract basis.

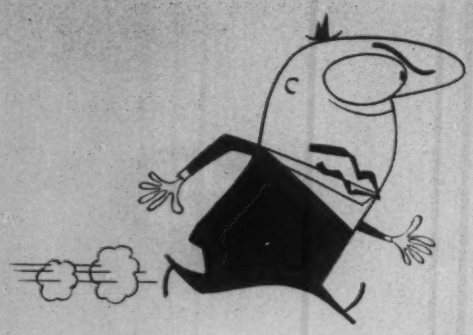
These consultants work on a specific job or on a continuing basis—and you can add them to the payroll either as advisers or as a complete technical department.

George C. Ensign, director of research for Elgin National Watch Co., Elgin, Ill., is a firm believer in outside research. "The organizations with which we work make available to us more millions of dollars worth of equipment and operators trained to use them than we could dream of purchasing for use in our home laboratories."

Mr. Ensign says you should consider the services of the outside research facility in any of these situations:

- You lack qualified men to attack a problem.
- You're short of research space or equipment.
- You can't afford the investment required for the research.
- It's an old problem and you are out of ideas.
- You just don't know how to tackle it.
- It calls for a variety of skills that you couldn't justify hiring for your own laboratory.
- It seems ill-advised to expand your staff to take on a study when it looks like a temporary thing.

Mr. Ensign figures $1200 to $1500 a month per research worker are good round figures to use in



Get Off to a Good Start . . .

• It can cost as much to develop a failure as it does a whopping success. The difference may be in the kind of job you do in evaluating the product before R&D begins. Here are some questions to consider. If any raise serious doubts, beware:

Are we equipped to develop the product?

What is its market potential?

Can it be marketed by our sales force, agents or dealers?

Will it give us serious problems in manufacturing?

Can we afford to make and distribute it?

Will it have any adverse effects on our organization or present products?

What are the estimated production cost, selling price and gross margin?

Will there be a raw materials problem?

Are there important patents, licensing agreements or other legal restrictions that will affect manufacture or sale?

Source: Based on "Management Aid for Small Manufacturers" #82, a Small Business Administration publication.

figuring the cost of outside help.

Tip—Close liaison between your home staff and the outside group can't be overemphasized. Mr. Ensign assigns an Elgin research engineer to direct a project, and it becomes his project. This spikes rumors or fears that management doesn't trust the company staff with the project. The broadening experience gained by staff members in directing the work is invaluable. It also saves wear and tear on the research director.

Don't Overlook Fringes

For the average company, there's only one justified reason for research and development: To earn a bigger profit than it possibly could without the effort. The only real measure of success is the profit and loss statement.

But don't overlook some extras. You can't measure them in dollars, but you can bet your shirt they're worth something to you and the company.

First, a good research department can get you closer to your customers.

At Selas Corp. of America, Dresher, Pa., a modern laboratory is given over to contract work and research on special problems for customers. A builder of special heating equipment, Selas carries on this research alone or works in cooperation with customers. In a brochure describing the service, Selas reports: ". . . much of the research, development, design and construction undertaken by Selas for its many customers are of an exploratory character . . . Selas' relationship with each customer is extremely close . . ."

Many companies use their research facilities as showplaces. They escort customers and prospects through them to prove they're aggressive. The payoff here is immeasurable, but it's no secret that people are impressed most with the company that is dynamic.

A warning: The lab is a showplace only after it's tailored to R&D needs. The experts warn against pouring money into a facility just to show off.

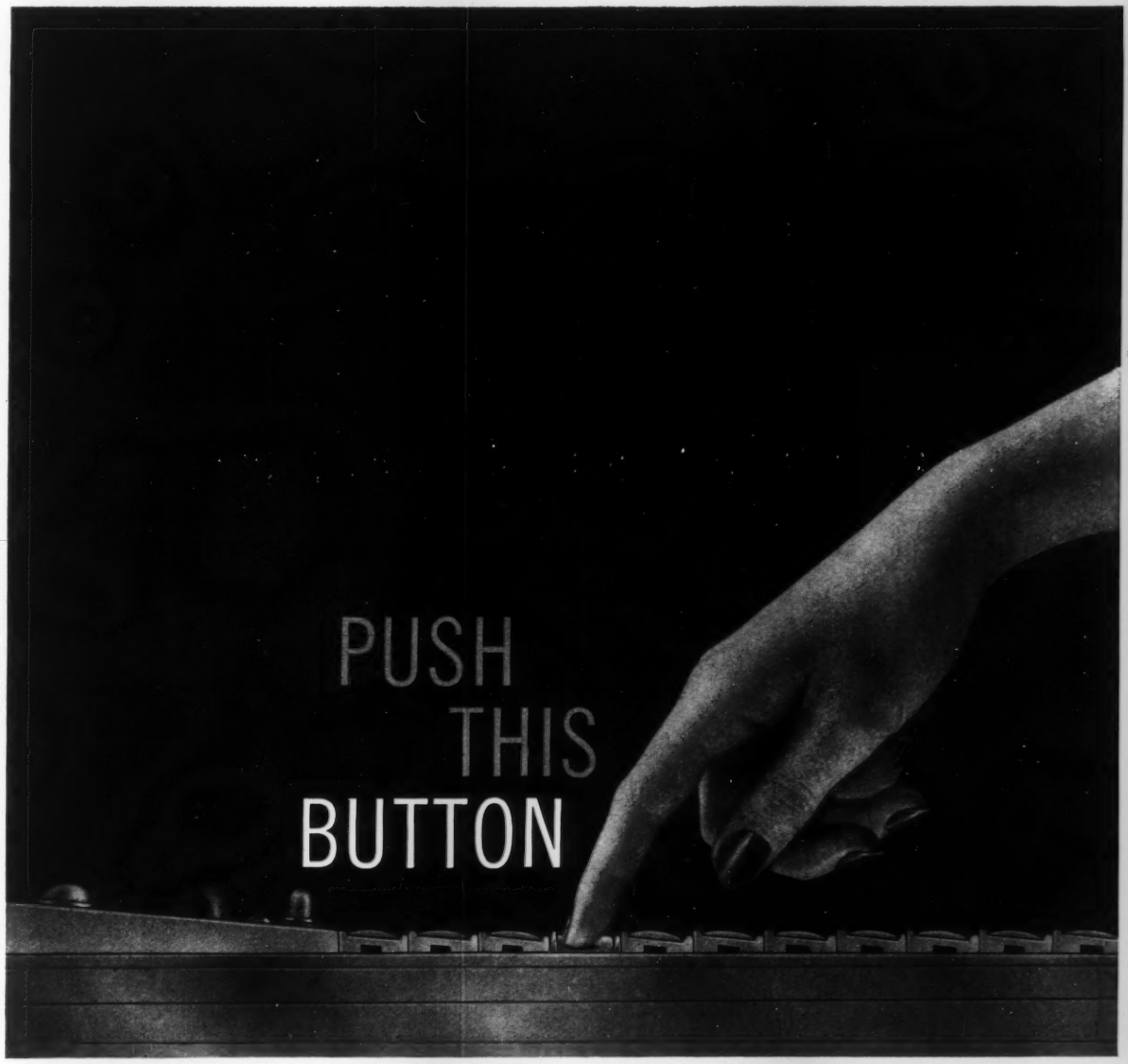
Finally, investors watch a company's research job. Winthrop H. Smith, managing partner, Merrill Lynch, Pierce, Fenner & Beane, says of today's investor: "He is likely to place value on the efforts companies make to perpetuate themselves and research they undertake to generate further growth."

Face Up to the Facts

Even for the small business, the question no longer is: "Can we afford to research?" It boils down to: "How much can we afford not to do?"

A recent 11-industry survey showed: The top three industries spent an average of 5.7 per cent of sales for research and development; they had a 52 per cent profit gain for the period. The middle three spent 0.9 per cent; they picked up 9 per cent in profits. The bottom three spent 0.2 per cent; they had a 3 per cent profit loss.

As we stated at the outset, this is only the beginning. The pace of technology is still gaining momentum. The cost of standing still is already exorbitant.



to eliminate maintenance inventory control headaches

Maintenance inventory control is often one of the biggest headaches in any plant. And a very expensive headache it can be in terms of costs. Neglected, it eats into profits. Yet proper maintenance inventory control can mean big savings all around. It eliminates shortages . . . reduces investments . . . cuts clerical red tape. And it's so easily achieved with a Remington Rand Robot KARDEX®. For this completely automatic, visible record system is a *time and effort saver*. At the touch of a button any one of over 4,000 sets of records instantly appears, putting before you all the important facts you need for positive maintenance control – the facts needed for quick analysis and fast decisions that lead to profit-making action. And the Robot KARDEX is a *money-maker too!* Clerical productivity and morale are increased . . . valuable floor space saved. It more than pays for itself in a very short time. Equally important is the fact that the Robot KARDEX system is adaptable to any *individual* maintenance inventory control problem.

Robot KARDEX can make *your* maintenance inventory control headaches vanish. Write today for more detailed information. Room 1746, 315 Fourth Ave., New York 10.

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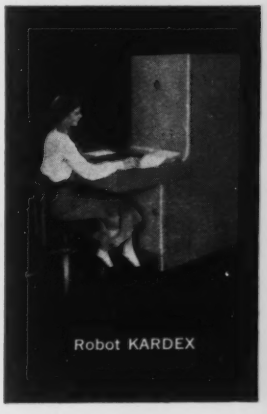


the heart of the jet . . .

— DEPENDABLE FORGINGS —

Ever since the beginning of the development of mechanical power, the heart of power producing machinery has been forgings.

The latest development in the field of mechanical power is the aircraft turbo-jet engine. Here again, the important highly stressed components — the turbine wheels and the compressor discs — are forgings and here also more of these forgings are produced by Wyman-Gordon than by any other company.

Entirely new problems, mechanical and metallurgical, are involved in the production of these vital parts — problems which require the maximum in experience, know-how and research facilities. Wyman-Gordon excels in all of these areas and continues today as for nearly 75 years in the forefront of new forging developments.

Seen through the porthole of this compressor disc is the finished forging — an example of the ultimate in quality and precision.

WYMAN-GORDON COMPANY

Established 1883

FORGINGS OF ALUMINUM • MAGNESIUM • STEEL • TITANIUM

WORCESTER 1, MASSACHUSETTS

HARVEY, ILLINOIS • DETROIT, MICHIGAN

Technical Outlook

ELECTROPLATING REFINEMENTS—A Navy report claims marked reduction in hydrogen embrittlement by electroplating from a cadmium bath with amino acids (a cyanide bath is standard). In an Air Force plating project using fluoborate solutions, a cadmium-tin coating was found to have excellent resistance to salt spray, jet fuels, high temperature synthetic oils and organic acid vapors. It showed little embrittling of hardened steel, which was attributed to operating the fluoborate bath at 100 per cent efficiency.

SELF-REDUCING ALLOY—Vanadium is being produced in this form by Electro Metallurgical Co., a division of Union Carbide Corp. It's an economical, highly soluble source for electric furnace steels. The alloy is packaged in moisture-proof cans, each containing 5 lb. Recovery is said to exceed 98 per cent. Electromet also makes a self-reducing tungsten alloy.

MINIATURE EQUIPMENT TIMER—A tube the size of a cigarette filter tip shows how long electronic equipment has been operating. It may help prevent a costly breakdown, says Raytheon Mfg. Co., Waltham, Mass. The timer will allow manufacturers to run life-span tests and predict more accurately how long their product will last. It could find extensive use in aircraft, where reliability is of utmost importance.

SIMPLER SPECTROANALYSIS—Scientists at U.S. Steel's Research Center, Monroeville, Pa., have developed a simplified technique to make spectrochemical analyses of samples of unknown origin and composition. It's known as the "carbon-matrix technique." A tiny amount of the sample is placed in a small crater drilled into the end of a graphite electrode. When it is placed in the electrical discharge, the carbon dilutes the sample and provides a standard substance. A small amount of germanium is used to produce a reference intensity in the spectrum.

CONTROLLING STRESSES—Physical properties of electrodeposited nickel can be controlled by adding a new chemical (PCN) to a Watt's solution plating bath, says Seymour Mfg. Co., Seymour, Conn. Stress in the plate can be controlled from zero to 8000 psi compressive, the manufacturer states.

SONIC FATIGUE—Vibrations of about 150 decibels can cause structural damage resembling fatigue failure, aircraft designers are discovering. It's an urgent problem because more and more power is being put into jet and rocket engines. Measures to combat sonic fatigue include: Making structures more rigid; selecting materials for their modulus of elasticity. It also may be necessary to put vulnerable equipment, such as electronic tubes, in front of the power plant.

LIGHTWEIGHT GAS TURBINE—The Army Corps of Engineers, Ft. Belvoir, Va., and AiResearch Mfg. Co., Phoenix, Ariz., are working on a new gas turbine that will weigh 326 lb, one-tenth that of comparable diesel or gasoline engines. The turbine will be used to operate a 100-kw generator set and in other applications where portability is important. It will produce 286 hp at sea level and 170 hp under extreme environments.

Metalworking Outlook—p. 47 Market Outlook—p. 157

All in Favor of LPG:

1. Long engine life.
2. Low maintenance costs.
3. Low fuel costs.
4. Low oil consumption.
5. Complete combustion.
6. Long spark plug life.
7. High thermal efficiency.
8. High compression ratios.
9. Safe to handle and use.
10. Smooth performance.

LPG truck handles wire coils at Wire Sales Co., Chicago

What LPG Trucks Offer You

Industrial users are moving from gasoline types to these units. The many advantages of the fuel are said to outweigh the slightly higher cost of the trucks

THE CASE for liquefied petroleum gas (LPG) engines in fork lift trucks is a strong one. Their major advantages are listed above.

Nearly all manufacturers of gasoline-powered trucks now offer LPG engines on all their products. Towmotor Corp., Cleveland, reports its sales of LPG units went from practically nothing in 1955 to 15 per cent of total volume in 1956. This year, one of every four trucks sold is LPG powered.

Less Maintenance—The big selling point for LPG is low maintenance costs. Wire Sales Co., Chicago, a fabricator of steel wire, says the conversion of its fleet of seven Clark trucks resulted in a saving of $300 a month on servicing and maintenance costs. Another $400 a month is saved in gassing the truck fleet, says Fred Muntwyler, vice president.

Several characteristics of LPG combine to bring about reduced maintenance costs: 1. Complete vaporization. 2. High octane rating. 3. Chemical purity.

Cleaner Engines—LPG is contained under vapor pressure in the fuel tank as a liquid. The liquid fuel is forced from the tank by gravity and vapor pressure through a filter and a solenoid valve that is open only when the engine is turning over.

The fuel enters a high pressure regulator, vaporizer and low pressure regulator, which usually are combined in one unit. The vaporizer uses engine cooling system water to provide heat for vaporization. The low pressure regulator reduces pressure to slightly less than atmospheric, and the vapor enters the carburetor. (The LPG carburetor is much simpler than one for a gasoline engine. All it must do is mix the vapor and air in proper proportion.)

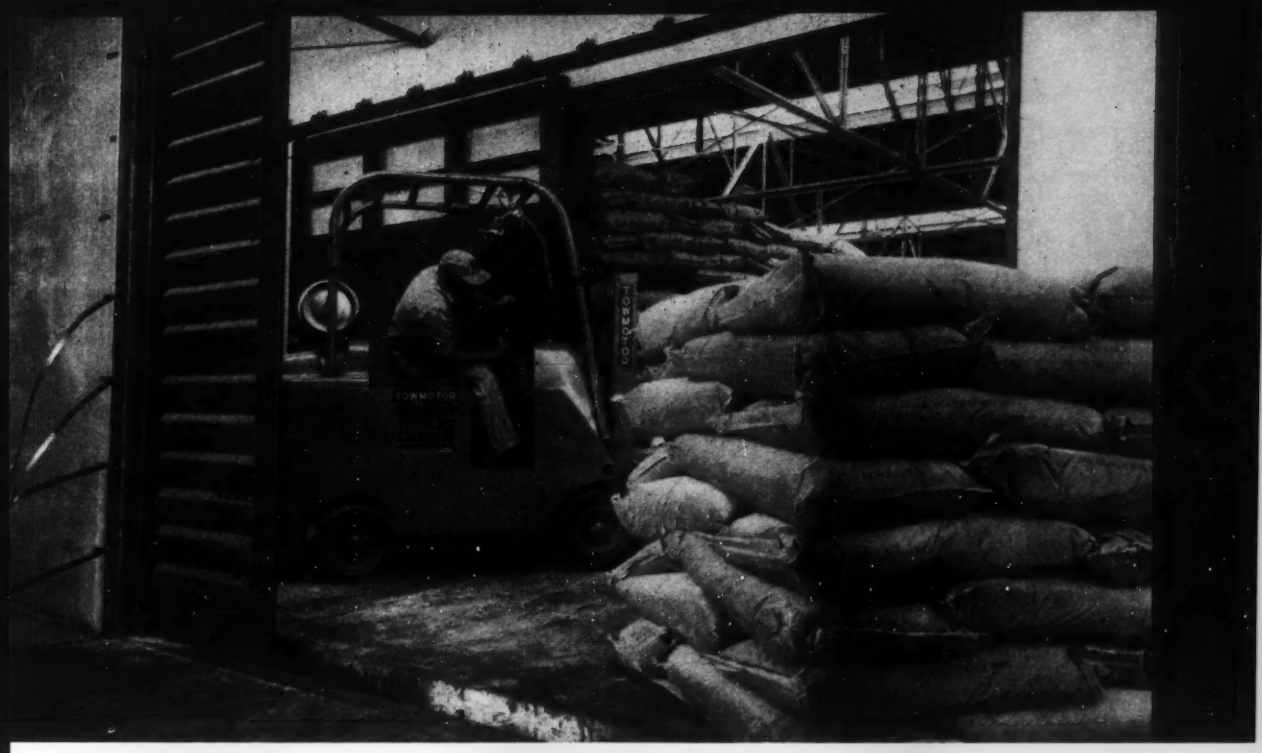
There is no washing of cylinder walls with unvaporized fuel and the consequent dilution of oil. The almost complete combustion of fuel creates little carbon on valves and plugs, and the thermal efficiency of the engine is increased.

More Power—The octane rating of LPG is about 100; gasoline normally used in industrial trucks is in the 65 to 80 octane range.

This means compression ratios can be increased to improve power output and thermal efficiency. It makes up for an approximate loss of 27 per cent in Btu per gallon of LPG compared with gasoline.

Leaner Mixtures—Gasoline is a mechanical mixture containing additives, and it is subject to variation in the proportions of the mixture. LPG is a mixture of propane and butane, chemical compounds which will always be constant in properties and always give the same performance.

(In some areas, pure propane is used in LPG engines. In the



Unloading bulk materials from a freight car with an LPG fork lift truck

northern part of the country, LPG usually is a mixture of 95 per cent propane and 5 per cent butane.)

LPG is cleaner burning than gasoline because of its dry vapor state in the combustion chamber. This factor also accounts for better fuel distribution among the cylinders. Air intake can be increased about one ratio to provide leaner idle and power mixtures. The additional power permits the truck to accelerate to travel speed sooner, so periods of high fuel demands are shorter.

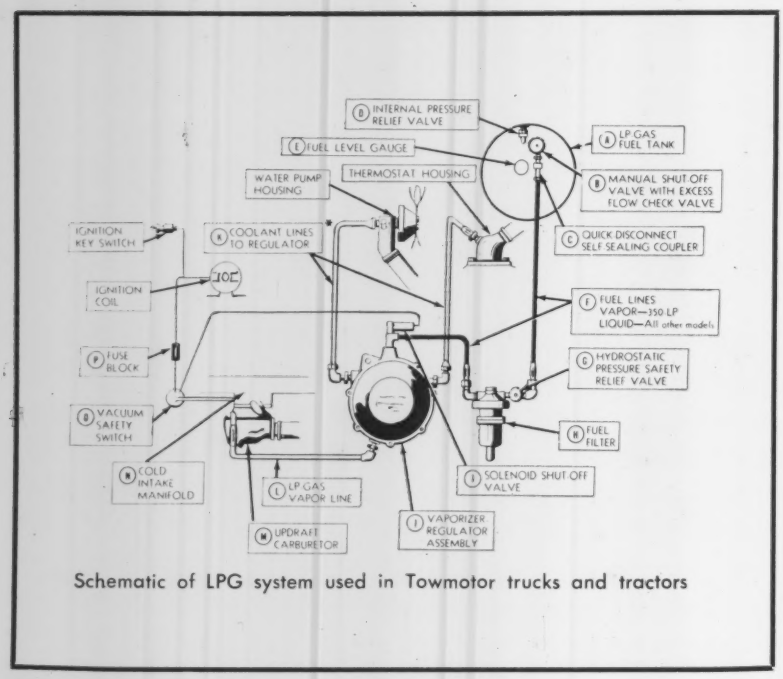
Exhaust gases of LPG contain less carbon monoxide and physiological irritants (such as the formaldehydes) than those of gasoline.

Fewer Oil Changes—E. C. Curtis, assistant chief engineer, development, at Towmotor, says gasoline trucks used in its operation run 50 hours between oil changes, LPG trucks 300 hours.

The principal contaminant of oil in industrial trucks is unvaporized gasoline. Since it is eliminated with LPG, truck users find they have to use a lighter oil — with LPG the oil gets heavier with use.

Fuel May Be Cheaper—In many areas, particularly those close to a supply source, LPG is cheaper

LPG fork truck handles palletized wire containers in a warehouse aisle


B INTERNAL PRESSURE RELIEF VALVE
L FUEL LEVEL GAUGE
A LP GAS FUEL TANK
WATER PUMP HOUSING
THERMOSTAT HOUSING
B MANUAL SHUT OFF VALVE WITH EXCESS FLOW CHECK VALVE
IGNITION KEY SWITCH
K COOLANT LINES TO REGULATOR
C QUICK DISCONNECT SELF SEALING COUPLER
IGNITION COIL
F FUEL LINES VAPOR—350 LP LIQUID—All other models
P FUSE BLOCK
G HYDROSTATIC PRESSURE SAFETY RELIEF VALVE
B VACUUM SAFETY SWITCH
H FUEL FILTER
K COLD INTAKE MANIFOLD
L LP GAS VAPOR LINE
J SOLENOID SHUT OFF VALVE
M UPDRAFT CARBURETOR
J VAPORIZER REGULATOR ASSEMBLY

Schematic of LPG system used in Towmotor trucks and tractors

than gasoline. In Cleveland, Eaton Mfg. Co. reports it pays 15 cents a gallon for bulk fuel, or 23 cents a gallon in cylinders.

Many plants have LPG on the premises as a stand-by fuel. This makes LPG trucks particularly attractive in terms of fuel cost. Sharon Steel Corp., Sharon, Pa., operates a fleet of 66 LPG-equipped pull and lift tractors, plus 22 auto trucks, power shovels and truck cranes. With 18,000 gallons of bulk storage capacity in the plant, the company buys its fuel for $0.1183 per gallon.

Two Types of Storage—Fuel can be stored on a truck in: 1. The ICC type detachable fuel cylinder. 2. The ASME type permanently mounted tank.

The ICC type usually is mounted on the back of the truck so it can be easily removed for filling. Tanks are available with vapor or liquid withdrawal, depending on the system design. (Most trucks use a liquid withdrawal system.) Filling is done by weight, under sealed conditions, making it necessary to pump the LPG into the tanks against vapor pressure.

The ASME tank has separate connections for filling, vapor return (during filling), vapor withdrawal and liquid withdrawal. It has a liquid level gage so it can be filled by volume. A bulk supply of LPG must be maintained.

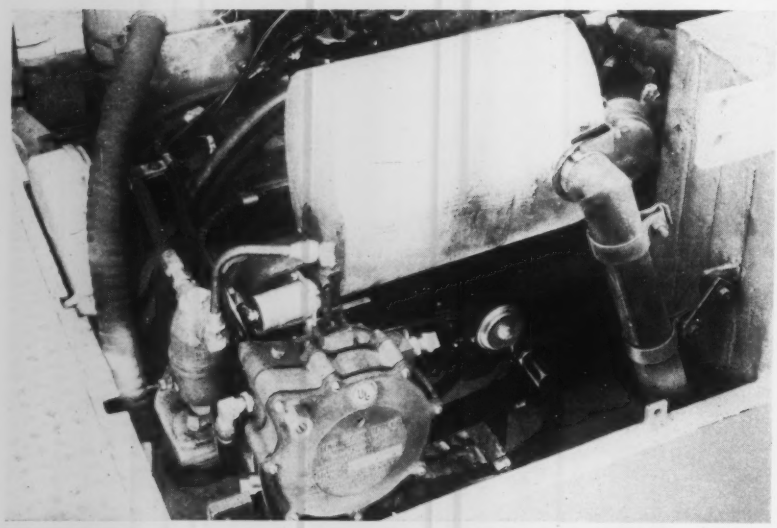
Engine Conversion—Nearly all LPG engines were originally built to use gasoline. LPG truck manufacturers make several changes to get maximum efficiency from the fuel. They also offer Underwriters' Laboratories approved kits for converting trucks in the field.

Since LPG forms so little carbon, there is nothing to cushion the valve closure and a premium material is provided to assure long valve life. Towmotor equips its LPG engines with Stellite faced exhaust valves and valve seat inserts. Valve rotators also are added.

The engine should be equipped with a cold manifold to supply cooler air-fuel mixtures to the cylinders. Since gasoline is a liquid, a warmer manifold is required to improve fuel vaporization. LPG at this point is a vapor, and a hot manifold would tend to become hotter since no heat is drawn from it to vaporize the fuel. By keeping the air-fuel mixture cool, better economy results since the higher heat value per cubic foot in the cooler fuel will develop more power at a given throttle setting.

Towmotor also installs a high compression head that increases compression by about 1.5 ratios. LPG will permit compression ratios as high as 10:1, but as this is approached in conventional systems, the returns diminish rapidly.

Satisfied Customers—A lot of industrial truck users are sold on LPG. P. T. Shirar, chief industrial engineer at Eaton Mfg. Co., says: "We intend to purchase only LPG trucks." Eaton has eight, three of which are converted gasoline units. To take advantage of the lower price, the firm is planning to put in bulk fuel storage capacity.



LPG engine in Towmotor truck. Left to right are fuel filter, vaporizer-regulator assembly, vacuum safety switch and muffler. Solenoid shutoff is above regulator

Shell clamps to indirect arc furnace before pouring

Stainless steel alloys are cast in heated molds

Here Are Three New Ways To Make Precision Castings

MISCO Precision Casting Co., Whitehall, Mich., has developed:

1. A faster investment casting process.
2. A new precision casting process.
3. A continuous vacuum casting system.

Investment Casting—The Mono-Shell process uses a ceramic shell to form the mold cavity instead of a massive investment mold.

Casting quality is improved because the material used to form the shell has improved refractory properties. Higher pouring temperatures can be used.

Compared with the standard investment process, less material is used. Cycles are shorter because less time is needed to remove the wax and preheat the molds.

Method—Wax patterns are used in much the same manner as they are in conventional investment casting. A thick ceramic shell is built up around the wax cluster by dipping it several times into a refractory slurry. A monolithic ceramic shell is produced, which, when fired to remove the wax pattern, is strengthened so that it can be handled with tongs and clamped to the melting furnace.

Misco has the process in pilot plant production. It can turn out 350 of these molds a day and expects to increase the rate.

Precision Casting—Many large castings require properties which are best produced by investment casting. Unfortunately, the process has size and weight limitations. Misco's Accra-Core fills the gap between conventional sand foundry practices and the investment process.

Method—Cope, drag and core sections of the mold are made from a mixture of quick setting, high temperature ceramic cement and refractory materials.

The mixture is cast against metal patterns or matchplates. Mold sections are dried in an oven, then assembled as a complete mold. It is preheated to 1500-1700°F to prepare it for pouring. Up to 150 lb of metal can be poured into these molds by shank ladles.

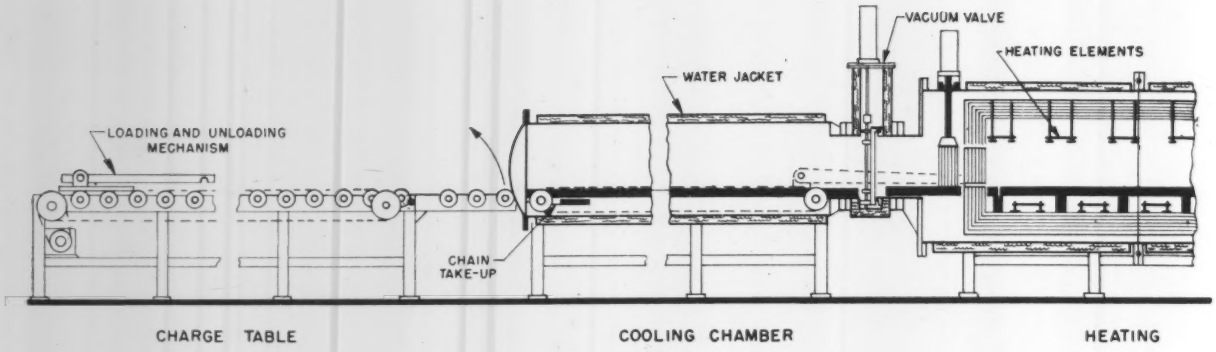
Stainless and low alloy steels can be cast effectively. Surface quality ranges from 150 to 200 rms. Dimensions can be held to closer tolerances than in sand casting, but parting lines and other variations keep accuracy below that of investment casting.

Typical parts produced by Misco: 1. Impeller wheels for boiler feed pumps. (Weighing 12 to 50 lb, they are made of AISI 410 alloy.) 2. Turbine casings. (Made of AMS 5366 alloy, they are 15 in. in diameter, weigh 45 lb; weight complete with sprues, gates and risers is 85 lb.) 3. Housings made of AMS 5362 alloy.

Vacuum System—The need for high temperature alloys for aircraft gas turbines is sparking the development of vacuum melting. It provides the protection which aluminum and titanium need when they are melted in combination with nickel and cobalt base alloys.

Misco engineeers collaborated with equipment builders in developing a vacuum furnace which permits continuous operation. Alloy and hot molds can be charged as needed through a system of interlocks which maintain constant vacuum in the melting chamber.

Cycling is rapid, and there is no oxidation or thermal shock damage to the melting crucible.



Vacuum Heat Treating Takes Hold

By R. R. GILER
Industrial Heating Division
Westinghouse Electric Corp.
Meadville, Pa.

ABOVE is a drawing of a vacuum furnace for semicontinuous annealing at high temperatures. It's the next step in the rapidly growing field of vacuum heat treating.

Still in the proposal stage, the furnace would operate like this: A charge would be loaded into the heating chamber from the left side through the evacuated cooling chamber. While it was being processed, a second charge would be readied on the right side. At the end of the heating cycle, the first charge would be withdrawn into the left cooling chamber and the second charge loaded into the heating chamber.

In Use—Many batch-type vacuum furnaces are in use in the titanium and aircraft industries. Titanium fabricators use them for degassing. Aircraft makers use them to stress relieve titanium and to braze stainless and other alloys at high temperature.

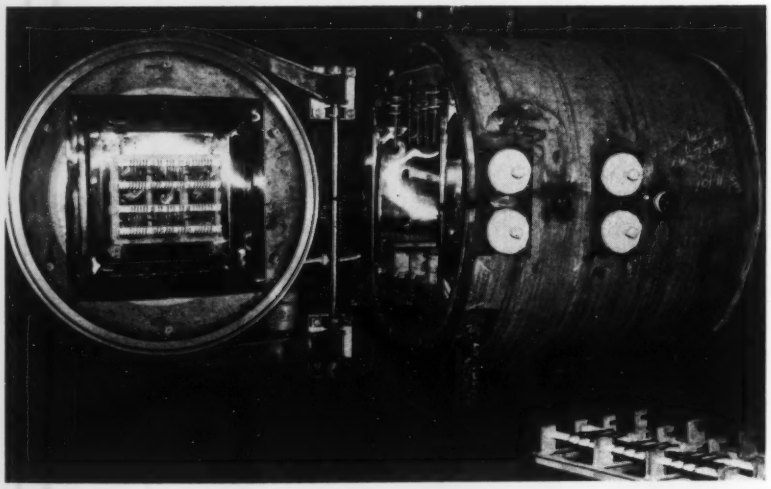
With one exception, the problems of building vacuum heat treating furnaces are the same as those connected with standard retort furnaces for atmosphere use. The new problem: Leakage. A typical furnace with 100 cu ft of volume, built to handle uranium, may have a permissible leak rate of 2500 micron cu ft an hour.

If the gas leakage were measured at atmospheric pressure, it would be less than 0.0033 cu ft an hour. It would take 1 cu ft about 13 days to leak into the furnace or 3½-years for the furnace to come from 1 micron to atmospheric pressure through leakage alone. The requirements of a good vacuum-tight retort and its limited life at high temperatures markedly increase the operating cost of such a furnace.

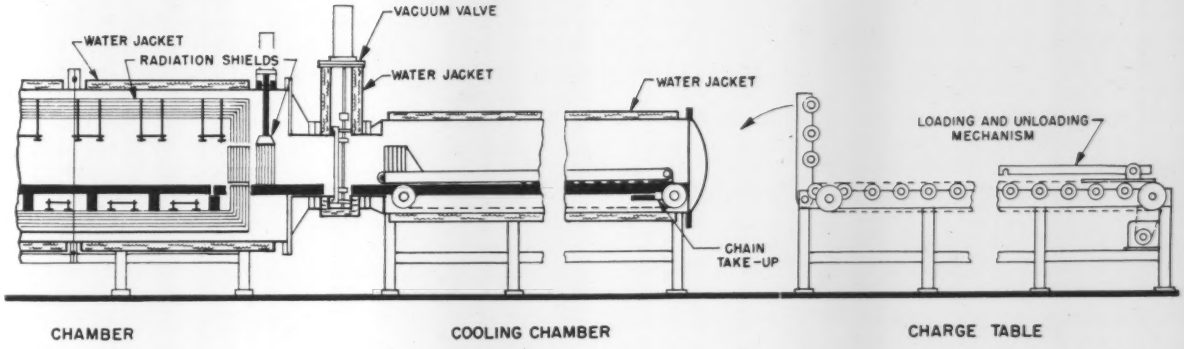
Continuous — The major problems in continuous units are the operation and maintenance of the inner valves. They are difficult to reach and must be absolutely leakproof.

Another great problem is material handling in the hot chamber. Most alloys that might be used for these parts will not withstand high temperature in vacuum because of the tendency of some alloying elements to vaporize. To date, the only acceptable and practical materials for this purpose are molybdenum, tantalum and carbon.

Radiation Shields — In vacuum, all heat transfer is by radiation.



Cold-wall vacuum furnace at AiResearch Mfg. Co. It's used for special brazing jobs



Chief users are the titanium and aircraft industries. Jobs range from the degassing and stress relieving of titanium to brazing of stainless at high temperatures

The rational way to insulate for radiation is with mirrors, or their industrial equivalent, radiation shields.

The first commercial furnace of this type was installed at Mallory-Sharon Titanium Corp., Niles, O., and is designed to vacuum anneal and degas titanium (see photo). It has a total rating of 450 kw in six heating zones to permit most efficient heating of all types of loads.

Cold Wall—Designed essentially for low temperature processing, the cold-wall unit has a usable charge space of 4 x 4 x 12 ft. To cool a load to room temperature, the furnace is flooded with argon which is circulated internally by a fan mounted on the door. The fan runs only when the furnace is filled with gas.

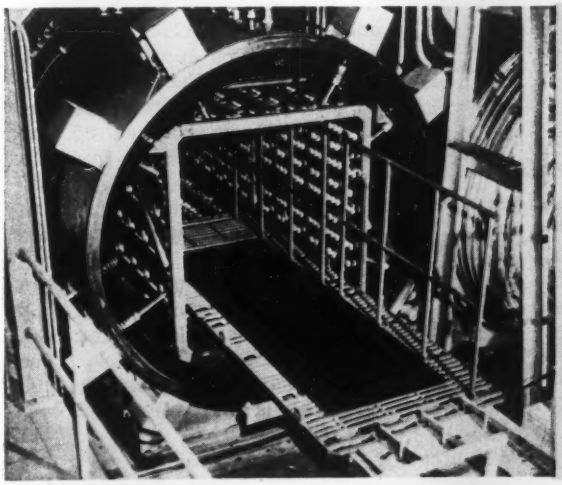
Since titanium can be exposed to air at 800°F, the fan normally is not used because cooling by radiation in a furnace of this type is relatively rapid.

Car-Type Loading—One of its main features is that it is a car-type furnace where the load can be placed directly on the car or suspended from a fixture which is attached to the car. Such a support fixture would be used if finished sheets were to be degassed. Sheets would be suspended individually, providing the best possible condition to degas and maintain reasonable flatness.

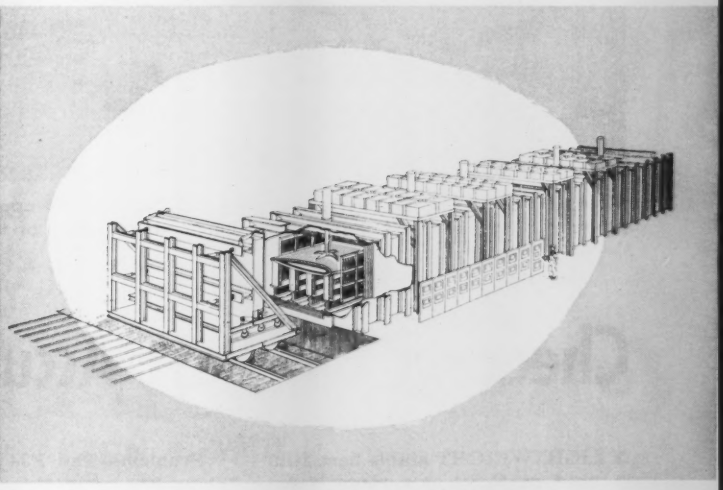
Because of extremely low heat storage and the low impedance which makes the use of efficient ejector type pumps practical, you get a cycle which is relatively short, compared with that of a double pumped vacuum furnace.

For equal loads of titanium, the degassing time of this type furnace is from one-half to one-third that of a standard hot retort type.

Higher Temperatures—The advantages of the cold-wall furnace are not fully realized until a higher temperature is required. A typical application would be in braz-



Radiation shielded furnace at Mallory-Sharon Titanium Corp. It's used to vacuum anneal and degas titanium



This furnace, now being designed at Westinghouse, is large enough to braze a complete aircraft wing

ing special types of stainless steels where fast cooling is necessary.

With some precipitation hardening stainless steels, cooling from 1400°F to room temperature in less than 1 hour after vacuum brazing saves an additional heating cycle in a separate furnace.

Typical Furnace — AiResearch Mfg. Co., Los Angeles, has a furnace for special vacuum brazing applications. Its maximum operating temperature is rated at 2150°F, and it has a 2 x 2 x 4 ft charge space (see photo). Temperature is regulated by two saturable core reactor controls of 75 kw each. The vacuum pumping system is mechanical; it consists of a rotary Roots type blower pump backed by a 130 cfm mechanical pump (Kinney KMB-1200/KDH-130 system).

This pumping system was chosen over the oil vapor-type pump for these reasons: 1. There is no danger of oil back-streaming into the furnace, and its operation is controlled by a pushbutton which eliminates involved sequencing. 2. The system will not create a vacuum which is high enough to cause vaporization of the brazing material. (A vacuum of over 10 microns at temperature frequently will.)

Built-In Cooling—Fast cycling is due to the low thermal inertia of the radiation shield-type furnace. To speed up cooling, the furnace is flooded with an inert atmosphere. A recirculating fan directs the cooling gas over the charge and then between the outer radiation shield and the water-cooled retort. The furnace acts as a built-in heat exchanger, and no external recirculating equipment is required.

Many new aircraft alloys will have to be processed in vacuum at high temperature. Since hot retort furnaces are not practical above 2100°F, it is necessary to use the cold-wall units. They are being used up to 5000°F and can be designed for specific jobs, such as extreme cycling rates. The trend so far has been toward general purpose types of furnaces, with applications ranging from stress relieving at 1100°F to brazing at 2100°F in the same furnace.

Large Parts—Another application for these furnaces is heat treating large parts where a hot retort of suitable size is not practical. One furnace has a charge space large enough to braze a complete aircraft wing (see sketch).

The possibility of doing such a job may change aircraft wing design. In addition to the greater shear strength obtainable through vacuum brazing, better purging of shapes, such as honeycomb cells, makes for sounder brazes. Also, since the furnace wall is cold, it is possible to extend members through it to compress the work being processed.

This method of dynamic loading makes it possible to apply a varying load to minimize distortion without crushing the part when it is at brazing temperature. It also eliminates the need for dead-weight type fixtures which would increase the thermal inertia of the system.

Progress—Vacuum heat treating equipment has progressed to the point where it will do most of the processing now handled in an atmosphere.

By using radiation shielding, it is even possible to build larger furnaces than you can with conventional bricked atmosphere construction.

Milling cuts on a 22-ft fighter plane wing are inspected by applying a transparent film over the part that contains an accurate outline of the wing

Checking Big Part Accuracy

A LIGHTWEIGHT stable base film is used at North American Aviation Inc., Columbus, O., to gage the accuracy of large parts.

Problem—The FJ4 Fury fighter plane has wing skins that are 22 ft long and 52 in. at the widest point. They must match with the beams and ribs to form a tight container for the jet fuel.

North American needed a checking method that was adaptable to the machine shop routine and did not require special tools.

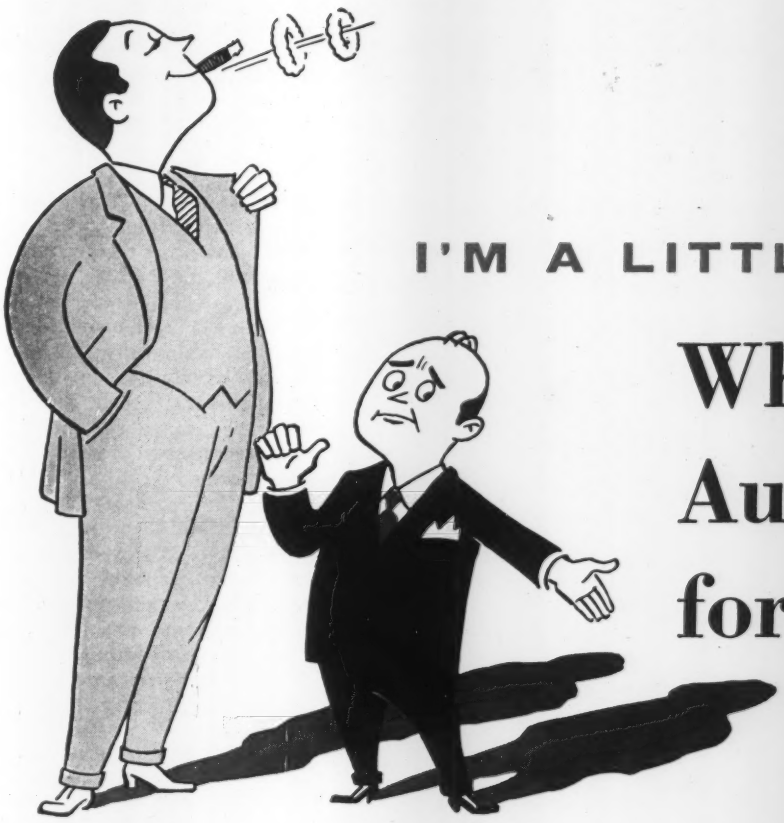
Answer—An accurate layout is made of the wing skin, showing all internal and external cuts and the location of all ribs, stringers and structural stations. This layout is made on Keuffel & Esser Stabilene film. The material has an inch per inch thermal stability of 0.000006 in. between 80 and 220° F, assuring freedom from distortion.

Copies of this layout are made in a Miller-Trojan Printer, using sensitized Stabilene film.

The film is tough and resists tearing, making it suitable for shop use. It can be rolled for storage.

Use — Gaging is simple. The wing panel is laid out and the film with the layout is unrolled over the flat surface.

One edge is aligned with the translucent outline and the other edges are accurately checked for proper alignment.



I'M A LITTLE GUY—

What's in Automation for me?

Depends on what you mean by automation. If you think of automation as a "push-button controlled automatic factory" the cost is probably beyond the means of the "small" manufacturer.

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When To Use: Air Oxygen / Ore Oxygen / Pure Oxygen

A Swiss steelmaker feels we'd be better off if we eliminated air from iron and steelmaking and built our practice around pure and combined oxygen

OXYGEN is going to play a far bigger role in iron smelting and steel refining than it has, believes Robert Durrer, managing director, Louis de Roll Iron Works Ltd., Gerlafingen, Switzerland. He pointed out to delegates at a recent Latin American steelmaking conference that the blast furnace, from the oxygen point of view, has some distinct disadvantages.

One is the dilution of the oxygen released in reduction of the ore by enormous quantities of nitrogen in the air blast.

The electric smelting furnace works without air. Gas produced in it is not diluted, so its thermic value is about three times that of blast furnace gas. Its quantity is also much less, so the height of the burden can be reduced.

Lower Shafts—But the electric (low shaft) smelting furnace can replace the blast furnace to only a limited extent. In most ironmaking regions, electric calories cost much more than coal calories. Even so, as a result of energy and raw material factors, production of pig iron in many parts of the world seems to be progressing from high shaft to low shaft (electric furnace) methods.

In the low shaft furnace, the use of oxygen takes first place among possible innovations. The use of gas with a high oxygen content is still in its infancy for ironmaking, but it will become all the more necessary once it is recognized that it is fundamentally obsolete to use air oxygen to produce pig iron, says Mr. Durrer.

Oxygen Steel—Processes for quantity production of steel (converter refining and open hearth refining) both use air to produce the necessary heat.

Although air refining is the cheapest method of transforming pig iron into steel, its applications are limited. Only certain types of pig iron can be blown with air. They must contain the necessary fuel — phosphorus in the basic process and silicon in the acid one. The basic method, used widely in Europe, is associated with ores having a high phosphorus content.

An additional weakness of air refining is that only relatively small amounts of scrap can be regenerated by it. About half the world's steel production is based on scrap, some nine-tenths of which is added to the steel furnaces. It has had to be used mainly in open hearth furnaces.

Opportunity—Drawbacks can be overcome by using oxygen instead of air. The fact that the pig iron may be defective in "fuel" (phosphorus or silicon) has practically no effect on oxygen blowing. A pig iron having 0.2 to 0.3 per cent phosphorus, which could not be blown in the Thomas converter because it is "chemically too cold," offers no difficulties in oxygen blowing. Areas which for this reason have had to use the open hearth process, can now turn to oxygen blowing.

Oxygen blowing results in much lower heat losses than air blowing. This means a corresponding increase can be made in the scrap charge—scrap which could formerly be utilized only in open hearth furnaces. No one is blowing Thomas pig iron with oxygen on an industrial scale, but the process can in all probability be carried out economically.

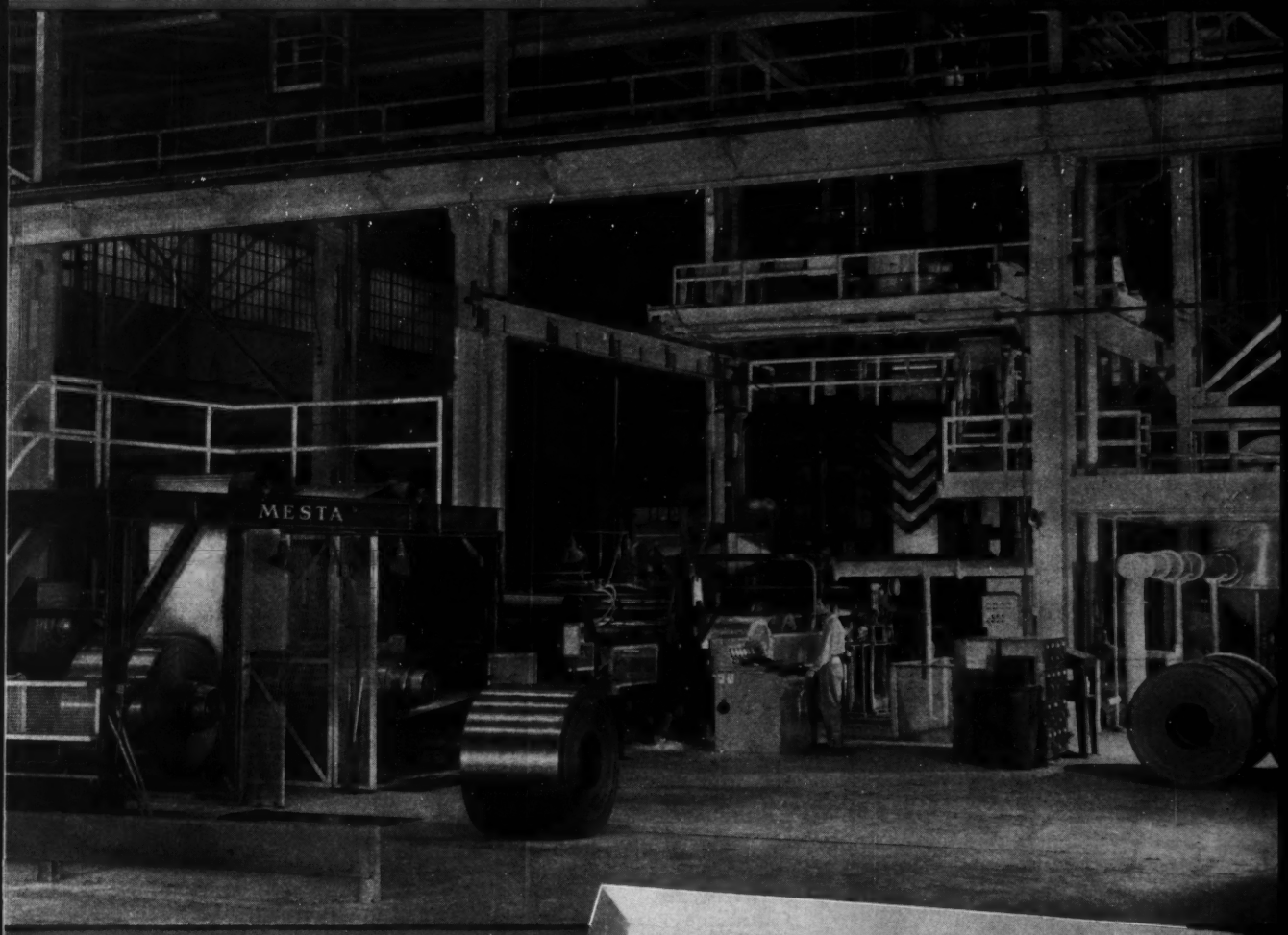
Pig in Electrics—In Austria, a 15-ton electric furnace has refined charges containing up to 70 per cent of Thomas pig iron. Depending on local conditions, it is possible to operate with free oxygen, combined oxygen (ore) or both.

If preference is given to free oxygen, the chemical heat reduces electric energy consumption so much that its price has no essential effect on the economy of the process. If this process could be carried out in larger furnaces, the way might be open for cheap refining of pig iron quite independent of its phosphorus content, even where electric calories are more expensive than coal calories.

Combined Oxygen — Compared with free oxygen, combined oxygen has to be separated from ore in the furnace, which requires time and energy. One advantage is that combined oxygen is pure, so that once liberated, it causes iron combustion without the smoke produced with oxygen blowing. Another is that no special oxygen-producing plant installation is needed.

Operations in a 15-ton electric furnace have shown that from the metallurgical point of view, the pig iron-ore method may be used

CONTINUOUS CLEANING *and* ANNEALING LINES



MESTA CONTINUOUS CLEANING AND ANNEALING LINE FOR TIN PLATE WITH PAY-OFF REELS, DOUBLE SEAM WELDER, SHEAR, AND TENSION REEL

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in the electric furnace. Preference has been given to the use of equal quantities of liquid pig and scrap, but greater proportions of pig iron have been used, showing that the process can be freely adapted to local conditions. The method is to be continued in a 40-ton furnace.

Versatile—It allows the refining of almost any composition of pig iron, up to 2 per cent phosphorus. The duration of the heat is less than 3 hours. The power needed for the reduction of the ore so far appears to be less than that required in the low shaft electric furnace. The heat loss is less than in other methods, the efficiency greater.

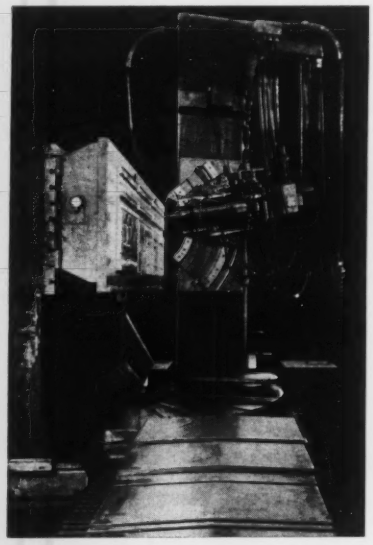
Experiments show that it is essential to refine with fine ore. (It is found in relatively large amounts all over the world.) The process is readily adjustable to variations in the ratio of scrap to pig iron and to the composition of the pig iron. The product is similar to electric furnace steel.

Contour Precision

It is being done in a hurry on the 16-in. lathe shown here. The heat treated steel body being turned is for a hydraulic accumulator used in aircraft. Contour accuracy and related wall thickness of the part must be held within 0.002 in. plus or minus. The automatic tracer unit makes possible a machining time of only 2.2 minutes per piece, and an air-operated arbor chuck facilitates swift loading and unloading of the workpieces. The lathe was made by Monarch Machine Tool Co., Sidney, O.

Milling Machine Works Five Axes

Part of the huge contract let by the Air Materiel Command, this machine is capable of moving around the cutter tip. It'll make F-104 jet interceptor parts



PRODUCTION men at Lockheed Aircraft Corp., Burbank, Calif., have a new milling machine that sports numerically controlled motion in five axes.

Called the Variax, the machine was first mentioned in STEEL, Jan. 21, p. 68. It is tailored to these aircraft needs: Generated step cuts, continuously variable angles, pocket and multiple recess milling, internal variable angles.

Five Motions — Here they are: 1. Horizontal movement of the column on the bed. 2. Vertical movement of the saddle on column ways. 3. In-and-out movement of the head along the spindle axis. 4. Head swiveling on the saddle. 5. Column swiveling on the bed.

Combinations of those motions, all numerically controlled, make it possible to generate a finished contour that doesn't require additional blending or hand finishing.

This is done by machining with either the flat end surface of an end mill, or the side of the cutter, or both. By utilizing the combination of movements, it is possible to position the tangent cutting line of the cutter coincident with the element lines which generate the surface geometry of the workpiece.

The machine (shown at left) was built at Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.

Special for Columns

Machining the many surfaces on machine tool columns often turns out to be a tough job. Engineers at Cincinnati Milling Machine Co. have come up with a special unit made of seven floor type milling stations positioned around two separate fixture bases. The unit mills surfaces of columns for dial type machines. It performs 17 operations on several sizes of both horizontal and vertical columns.

All seven stations are designed so that several operations may be done at once. Instead of shifting the heavy castings to machine each different surface, the casting is clamped to a rigid fixture where milling operations are performed at the four surrounding stations. At the same time, other operations are done on another casting at the three stations located around the second fixture.

Automatic machining cycles on many stations help to minimize nonproductive time. Added features: Automatic chip removal, centralized operating controls, rapid traverse rates up to 100-in. a minute.

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3 4 5 Save these three other ways: Buy Asarcon 773 and you save on machining time, since there's far less metal to remove. Buy Asarcon 773 and you get better service and longer life from your bearings — there are no blow-holes, pits, shrinks, sand or other foreign matter to cause trouble. Buy Asarcon 773 and you save on down-time — because you get greater yield strength, impact strength and fatigue strength than in the same alloy cast by any other method!

In short, buy Asarcon 773, and watch bearing costs tumble! For more information, talk to your local independent Asarco distributor, who stocks Asarcon 773 in 260 sizes of solids and tubes — or write us directly, and we'll demonstrate how others are saving with Asarcon 773.

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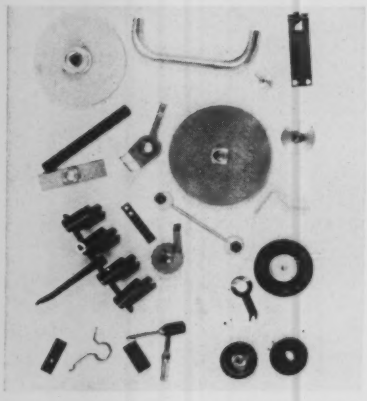
There isn't enough room under the punch for the operator's fingers in this perforating setup

Swaging setup, with vernier mechanical stop, permits consistent operation to 0.002 in. tolerance

Versatile Presses Cut Setup Time



Some of the parts made on hydraulic presses at General Radio

HOW would you plan production setups for a company that averages a new electronic instrument every month in lots of 50 to 100,000 units?

General Radio Co., Cambridge, Mass., designer and builder of test equipment, faces that problem. Setups have to be planned for perforating, bending, swaging and stamping of metals, plastics and ceramics of varying thicknesses.

Using standard hydraulic presses made by Denison Engineering Division, American Brake Shoe Co., Columbus, O., the company has worked out a program that keeps setup time low and safety standards high.

Perforating and Bending—Here's how General Radio keeps piece cost down in perforating and bending, as explained by W. G. Ritcey, production engineer:

The operator places the workpiece on the press and positions it with a permanent pin and thumbscrew. He selects the punch and die, adjusts the press stroke and then sets back and side gages. Dies and punches with mating stripper sleeves are changed in less than a minute. Operator safety is insured because there isn't room for his fingers under the punch or stripper.

Swaging—Inserts, hubs and terminals are swaged into insulating materials like ceramics and Bakelite. Swaging used to be done on a kick press with a positive stop, but operators had to "feel" their way because of variations in material thickness.

When quantities warrant extensive tooling, General Radio will set up semiautomatic swaging operations or even complete automation. Tooling is mounted on an index table. Pressure reversal provides swaging control to compensate for variations in screw - machined pieces.

A plastic cover over the tooling safeguards the operator. Another safety measure is the shipper rod collar which is set slightly below the regular ram stroke. If no part is in the tooling nest, the shipper arm contacts the collar and reverses the ram before the ram tool touches the nest.

Stamping — General Radio uses hydraulic presses for stamping legends on various metal parts. Correct setting of the pressure control regulates the impression and prevents depth variation, even on stock of different thicknesses.

For further flexibility in production planning, a press is mounted in a bench that rolls on casters. The unit can be shuttled from one section of the plant to another to achieve optimum grouping for diversified production.

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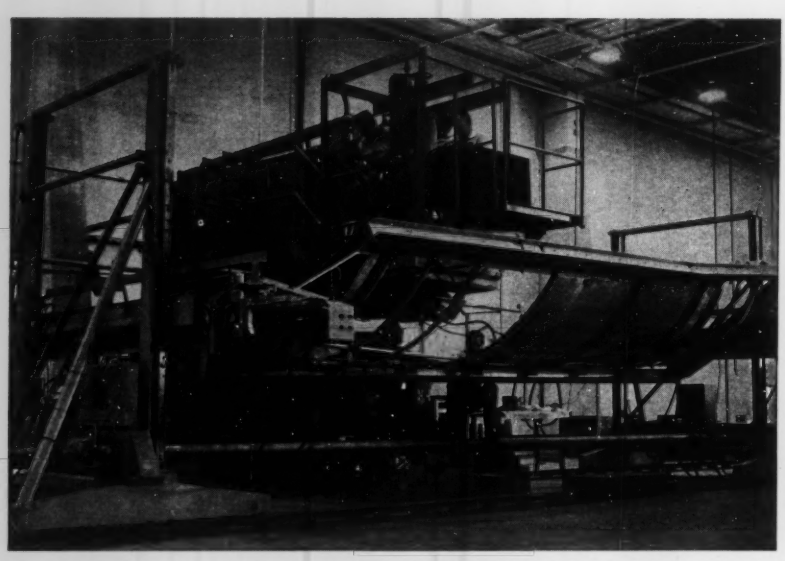


Here is the first unit being checked out by Ryan engineers. It spotwelds double contoured panels automatically. Positioner operates through screw jacks

Subassemblies are lower half of aft sections being made by Ryan Aero-

Double Contour Panels Spotwelded

Unusual positioning fixtures and tape control have made automatic spotwelding practical for subassemblies like those made at Ryan Aeronautical. Here is a progress report

SPOTWELDING saves production time and leaves a smooth, clean surface in the opinion of Ryan Aeronautical Co., San Diego, Calif.

The firm makes aft fuselage sections for the new Boeing 707 jet Stratoliner and the U.S. Air Force KC-135 tankers. Each section is 60 ft long. They are said to be among the largest aircraft structures ever subcontracted.

Equipment—Panels for the aft sections are carried through large resistance welders on automatic positioning tables developed jointly by Ryan and General Riveters Inc., Buffalo.

Tables maneuver the panels in any combination of three directions: Trunnions at each end tilt the table; vertical screw jacks raise and lower the table; horizontal screw jacks move the table in and out of the welder throat.

Controls—Spotweld direction and spacing are controlled through a tape with seven command channels.

To follow skin curvature, a tracing head is mounted next to the upper electrode of the welder. It senses the position of doublers and stiffeners and insures that spotwelds will be located correctly and uniformly along the edge.

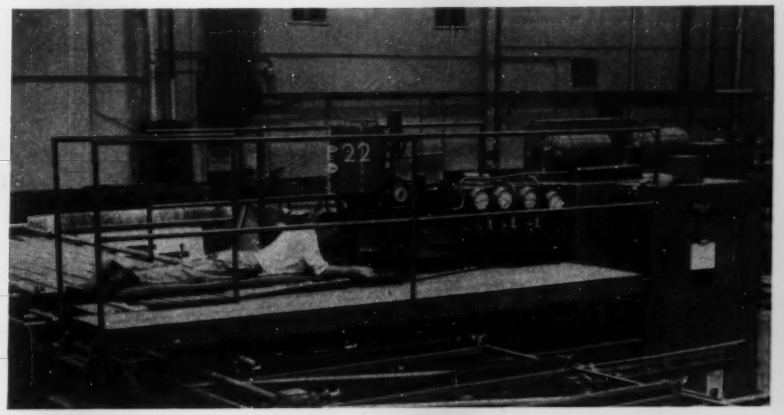
The combination of tape and tracing head provides two-direction control—the tape for spacing and the tracer to keep spotwelds parallel and in line with stiffeners.

Another control is a senser head which also is mounted on the electrode. It has four nylon knobs which contact the skin and sense contour. Two knobs govern vertical motion; one controls the right elevator; and the fourth controls the left elevator.

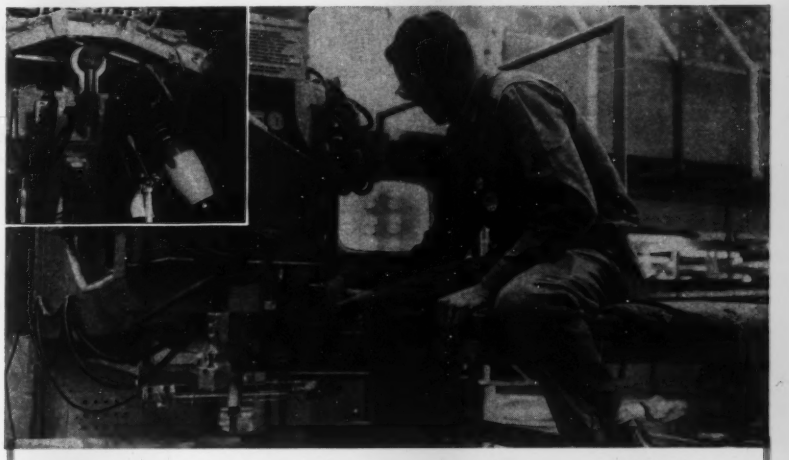
A pendant near the operator actuates the welder manually or starts the automatic tape control. Increment spacing also is controlled by the pendant.

Manual control locates the first spotweld and is used for loading and unloading. Tape controls nor-

nauticol Co. Both halves are mated at Boeing's main assembly plant



This Sciaky spotwelder handles single contoured skins automatically. Operator lies prone as panels are fed through electrodes



Operator watches spotwelds being made. TV screen enables him to see underside of welds. Camera is shown in inset

Automatically

mal welding operations, but increment control is provided for two purposes: 1. To make repetitive welds which are equally spaced, like those for fastening stiffeners to skins. 2. To assist in cutting tapes for command operations.

Equipment—A Federal welder is used for the double-contoured skins. Both Federal and Sciaky welders are used on single contour skins. The Sciaky has an exceptionally deep throat for its capacity: 70 in.

All spotwelding must be done within 24 hours after etching and cleaning. Skins are protected from fingerprints, oil and dirt through the use of special handling fixtures, covers and date stamping. Operators wear white gloves which are laundered frequently.

Ryan says that it takes more than 70,000 spotwelds to complete the subassembly.

TV Eliminates Spotwatcher

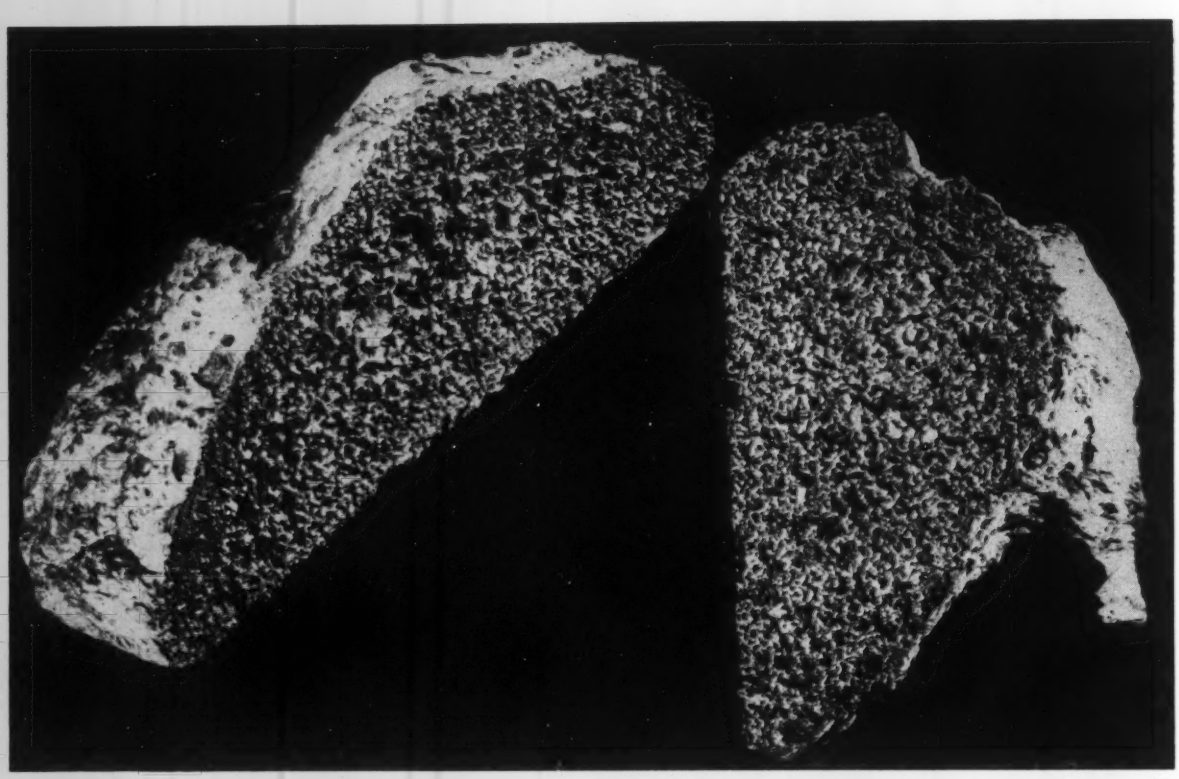
AT Ryan, television has replaced the man who watched underside welds for pickup—the visual signal that electrodes need cleaning.

A TV camera is placed near the bottom electrode and focused on the welds through wide angle and close-up lenses. The operator can select the view he wants. The image is magnified on a 17-in. screen.

A combination of fluorescent and incandescent floods overcomes glare.

Movement of the panels constantly changes the field of vision. The camera is mounted on a simple bracket which is remotely controlled. The operator can follow the line of welding in any direction by flipping a switch.

Aircraft skins are made from aluminum alloy covered with pure aluminum cladding. Dirty electrodes pick up the cladding—in severe cases the hard core is exposed, promoting corrosion.



In developmental form, new material looks like a loaf of bread. Bubbles are formed by metal hydrides dispersed in liquid metal

Aluminum Foam Is Rigid Core Material

Bubbly, lightweight product opens up interesting design possibilities. Will probably be used in honeycomb structures. Could become a lumber substitute

ANOTHER material that "couldn't be made" has been. It's foamed aluminum. The developer is Bjorksten Research Laboratories Inc., Madison, Wis.

A slice of foamed aluminum looks like shiny pumpernickel (see the photo). The material has been made only in experimental quantities, but a glance at its properties suggests that some day it will turn up in honeycomb sandwich structures, fuel cells, acoustic blocks and floats:

1. It can be made in densities ranging from 12 lb per cu ft (about as light as balsa wood) to 40 lb per cu ft.

2. Cell form can be closed (floating) or open (water-absorbent).

3. Bubble size can be as small as 1/64 or as big as ¼-in. and can be reasonably controlled.

4. Compressive and tensile strengths are low, but the material has great rigidity.

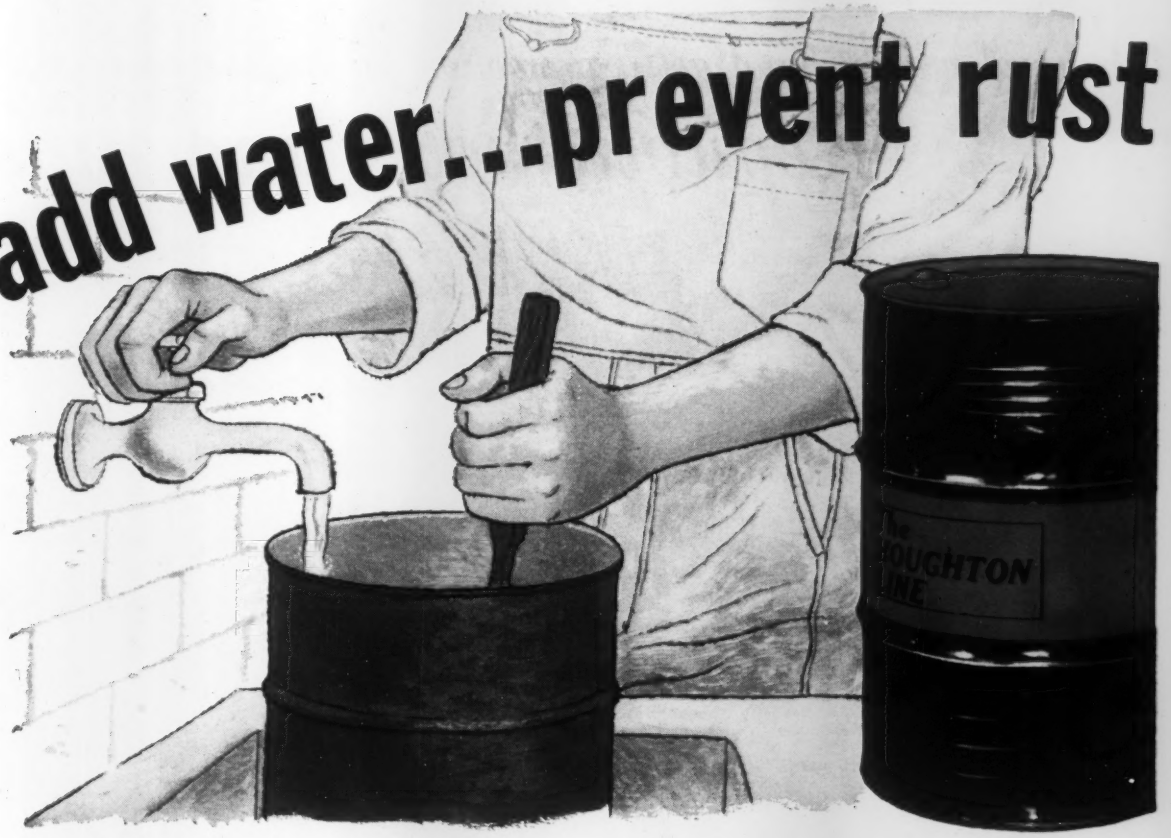
5. Eventually, it may be made in strips several feet wide, 3 or 4 in. thick and of unlimited length.

6. Being aluminum, it will not rot, rust or be the prey of insects and rodents.

Continuous—An Air Force contract has backed the development to the point where the problem of making the material in a continuous ribbon has been solved. Still to be worked out are closer control of density and shape. If a scaled up version of the Bjorksten pilot machine is built, one controlling factor will be the thickness of the material. It has to be thin enough to allow heat to escape before the bubble form collapses.

Heat can also be a problem in fabricating the material, but it can be sawed, nailed, cemented, screwed, soldered and brazed at temperatures below its melting point. Dow Chemical Co., Midland, Mich., is working on a similar magnesium product for the Navy. Dr. Johan Bjorksten, president of the Bjorksten laboratories, says he sees no good reason why the foam principle cannot be applied to steel.

add water...prevent rust



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- **RUST VETO A-2**
  For highly finished parts . . . tools. Leaves firm, waxy film easily removable by solvent. Used in Rust Veto Spray.
- **RUST VETO 266**
  Combination rust preventive, cleaner and neutralizer. Displaces water, residue and acids. For temporary, production-line protection of wet parts.
- **RUST VETO 377**
  A solvent polar type preventive for long term indoor storage. Withstands 30-day humidity cabinet test at 100°F.
- **RUST VETO 344**
  Produces fast drying polar-active asphaltic film. Used for long-term outdoor protection of ferrous and non-ferrous metals.

Yes, you're seeing right. Houghton's amazing new Rust Veto M.P. mixes with water. You can't get a cheaper solvent, and the result is a safe, efficient rust preventive that protects metal indoors or out.

You can also use this revolutionary new product as is or mix it with oil. Or, if you prefer a solvent mix, you can thin it with any commercial solvent. Its range of uses is practically unlimited.

Mixed with water, Rust Veto M.P. eliminates the fire hazard normally associated with rust preventives. And it's easy to mix. Just add water at 65°F and stir slowly.

Ask the Houghton Man about Rust Veto M.P.—or any of the special purpose rust preventives at left. They're being widely used, and they're often the answer to long-standing rust and corrosion problems. Call the Houghton Man today—or write E. F. Houghton & Co., 303 West Lehigh Ave., Philadelphia 33, Pa.

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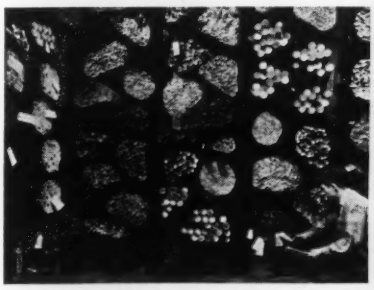

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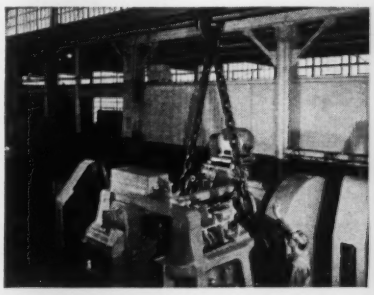

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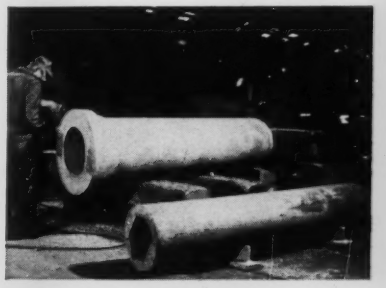

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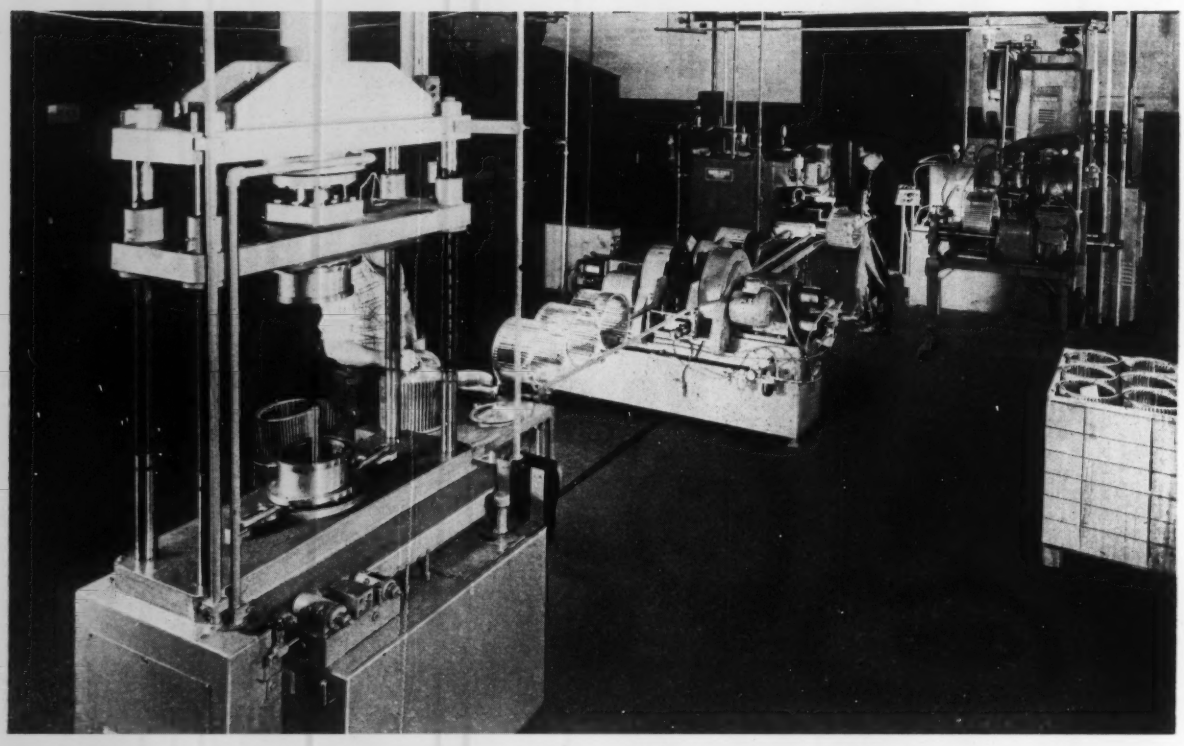


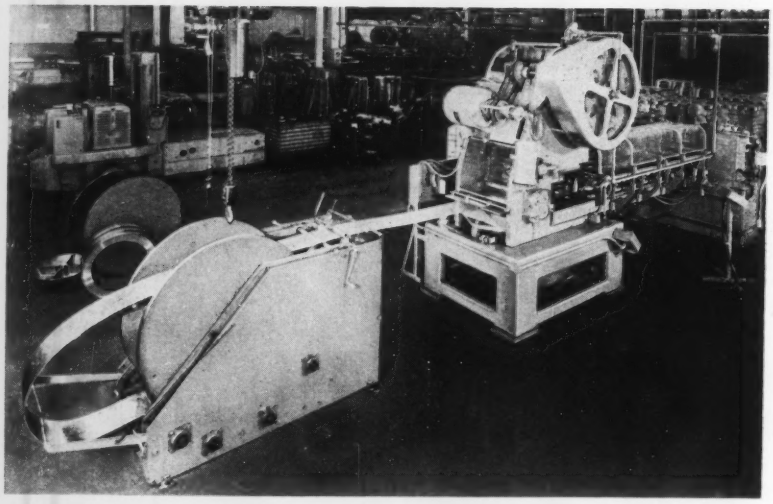
1—Over-all view of Airtemp's blower wheel manufacturing area looking from end of line

New Line Ups Blower Wheel Production

BLOWER wheels for air conditioning and heating equipment come off the new production line at Chrysler Corp.'s Airtemp plant in Dayton, O., at an average rate of one every 35 seconds. Smaller wheels can be processed at nearly a three-a-minute clip.

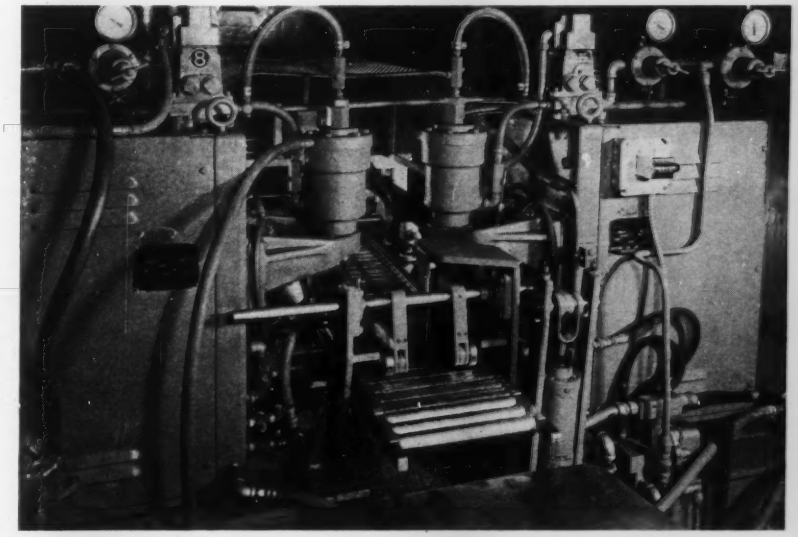
The compact manufacturing facility uses automatic machines to fabricate 12 sizes of wheels from strip. Airtemp says it can make better wheels for less than it can buy them.

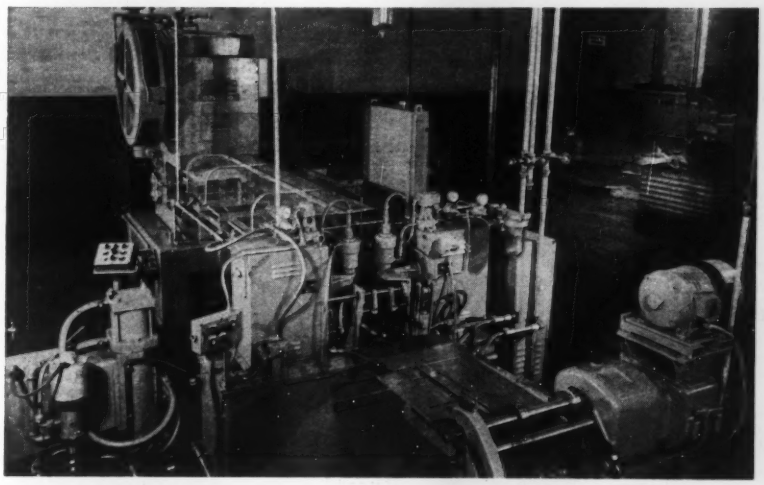
Two factors contribute to the improved efficiency of the new blower wheel, say company officials. It is made from galvanized instead of rolled steel. It is formed from only two pieces of steel, compared with the 50 or more used in some blower wheels.



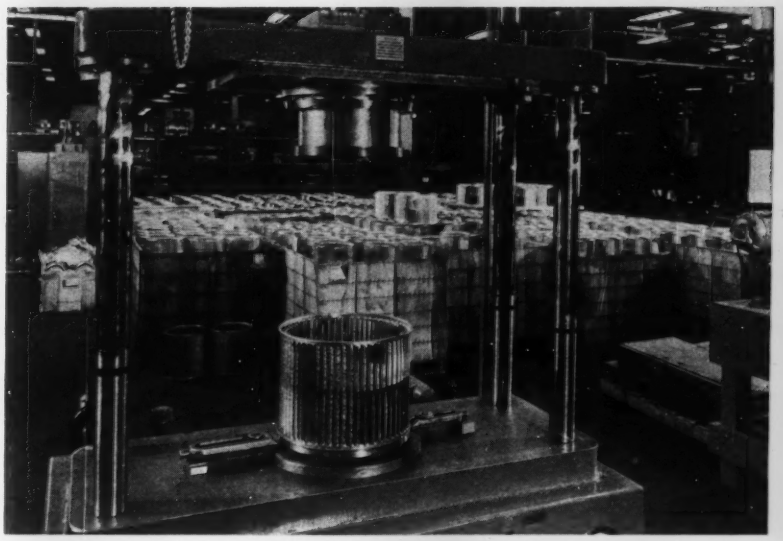
2—Blower wheel production starts here. Cradle feeds galvanized steel into press where two sections of curved blades are cut for each wheel . . .

3—Stamped blades move through an automatic transfer mechanism from the press to a spotwelder. Here two sections are automatically welded into a single piece and move to the next station where . . .





4—The blade strip is rounded into a wheel shape. Transferred to the next station by a workman, the rolled section ends are welded together, then carried by chute to a beading machine that rolls the edges (see photo No. 1). This strengthens the rim and adds rigidity to the structure . . .



5—A second workman inserts a center disc, containing the shaft collar, in the wheel and places it in this hydraulic press that expands and secures the disc. Final operation is inspection and balance

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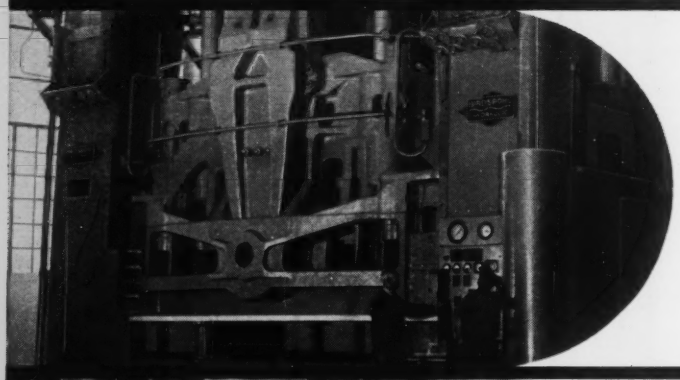
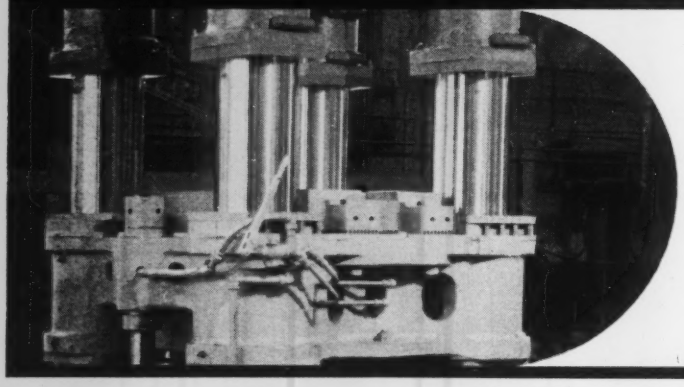
1 Press controls designed to meet specific applications and future adaptations. Automatic interlocking of controls assures accurate sequence functioning of various press components—minimizes dead cycle time.



2 Customized close manufacturing tolerances on guide ways assure precision alignment of the platens on this Birdsboro 8000-ton press.



3 Rugged design and construction of this 1500-ton Birdsboro press minimize misalignment and assure accurate mating of dies.

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New Light on Grinding Fluids

Results of tests at Mellon Institute indicate lubrication is more important than cooling

THE EFFECTIVENESS of a fluid in minimizing residual grinding stresses depends not so much on its cooling properties as on the lubrication it furnishes between the wheel and the work.

Cooling protects the abrasive wheel against mechanical or thermal stressing of the bond. It tends to cool the work and produce a stabilized depth of cut. Lubrication tends to reduce wheel face loading, glazing of abrasive grains and friction between the wheel and work.

Research—Those conclusions are the result of research at Mellon Institute, Pittsburgh, sponsored by

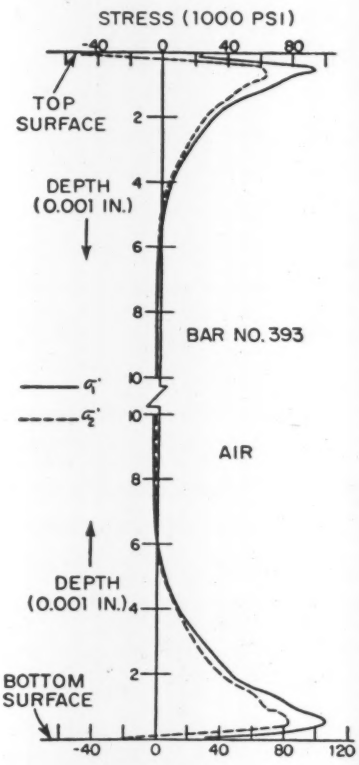

Fig. 1—Stress distribution curve for bar ground in air

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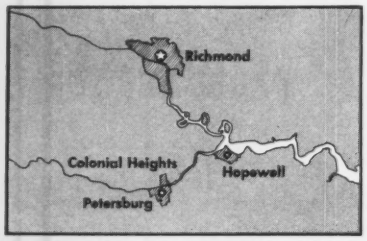

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the Grinding Wheel Institute and Abrasive Grain Association, Cleveland. They were reported by Dr. H. R. Letner, senior fellow at the institute, now with General Electric Co., Cleveland.

Grinding experiments were done in air, two concentrations of rust inhibitor in water, six water soluble oils and four straight grinding oils (see table on page 132).

Tests — Bars of AISI 52100 chromium steel, hardened to Rockwell C 59, were used. After heat treatment, about 0.010 in. was ground from each side of the bars to remove the metal containing the highest heat treating stresses.

Tests were made on a horizontal spindle, reciprocating table surface grinder with an aluminum oxide wheel. It's peripheral speed was 6000 fpm. Crossfeed grinding, removing 0.001 in. of stock on each complete crossfeed, was used. Total stock removal was 0.010 in. Grinding fluids were fed to the periphery of the wheel with sufficient flow to cover the work surface.

Results—Stresswise, water solu-

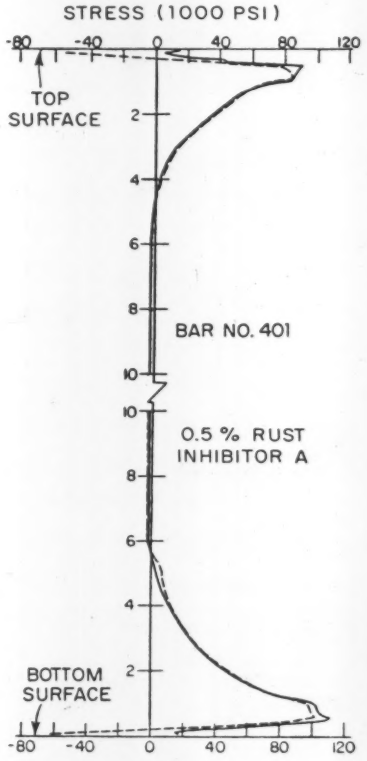
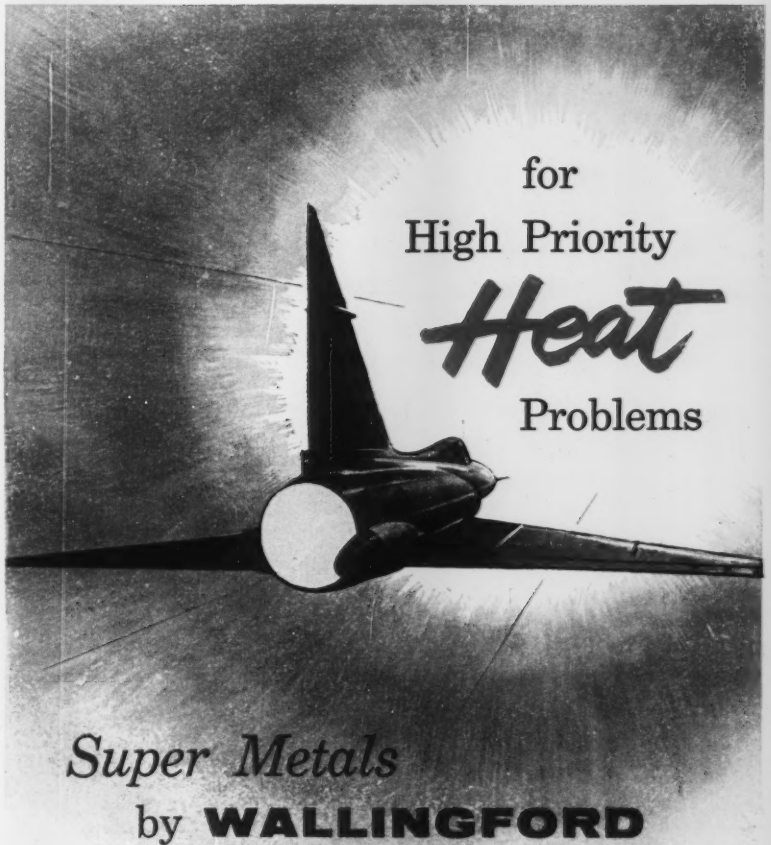


Fig. 2—Stresses in bar ground in 0.5 per cent rust inhibitor



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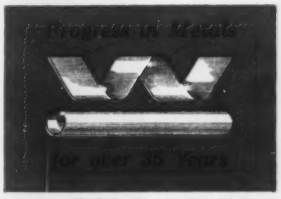

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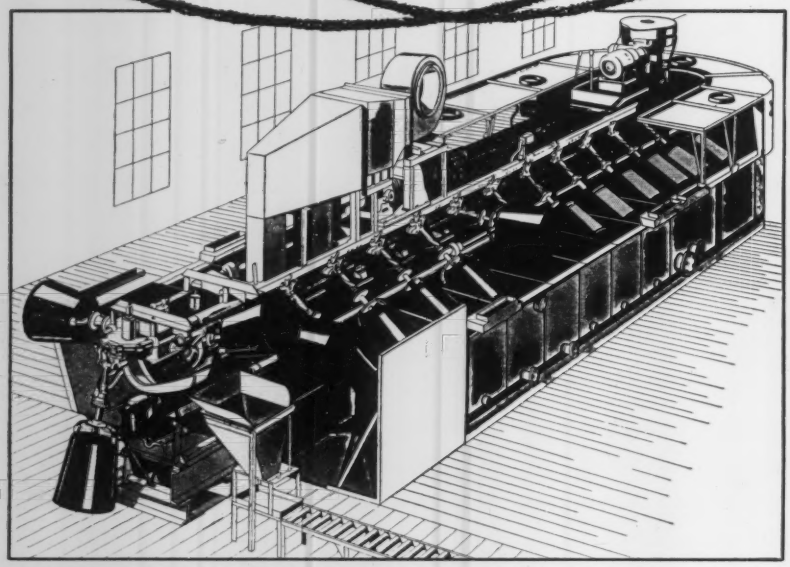

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tions of rust inhibitor or soluble oil showed little advantage over dry grinding. Such solutions, however, minimize local temperature variations, which, because of thermal expansion of the workpiece, result in varying depths of cut. This can appreciably influence stress.

The 2.5 per cent emulsions of soluble oils appear to reduce the tendency for stress distributions to level off or turn upward close to the surface. Experimental data, however, show that the stresses at the surface are no higher, perhaps lower, than at a depth of 0.00005 in. where the stress curves begin.

Lubrication—The influence of a straight oil on grinding stresses appears to depend on the oil, but all four straight oils used resulted in substantial compressive stresses at the surface of the bars.

Judged by the magnitude of the peak tensile stresses, oils I and K gave the most desirable stress distributions. The reason is not apparent. This situation points up the need for further research to determine whether such behavior correlates with the chemistry of the oils or their physical properties, other than viscosity.

Heat—The fact that stresses ob-

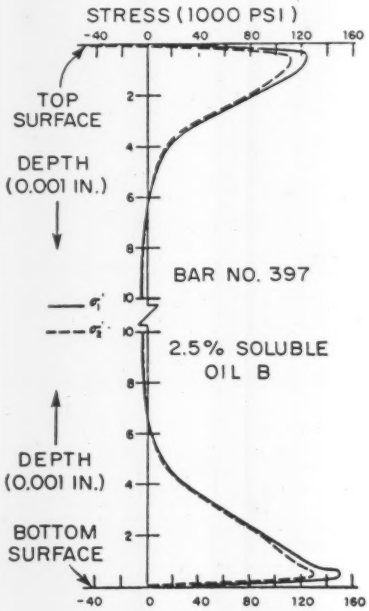
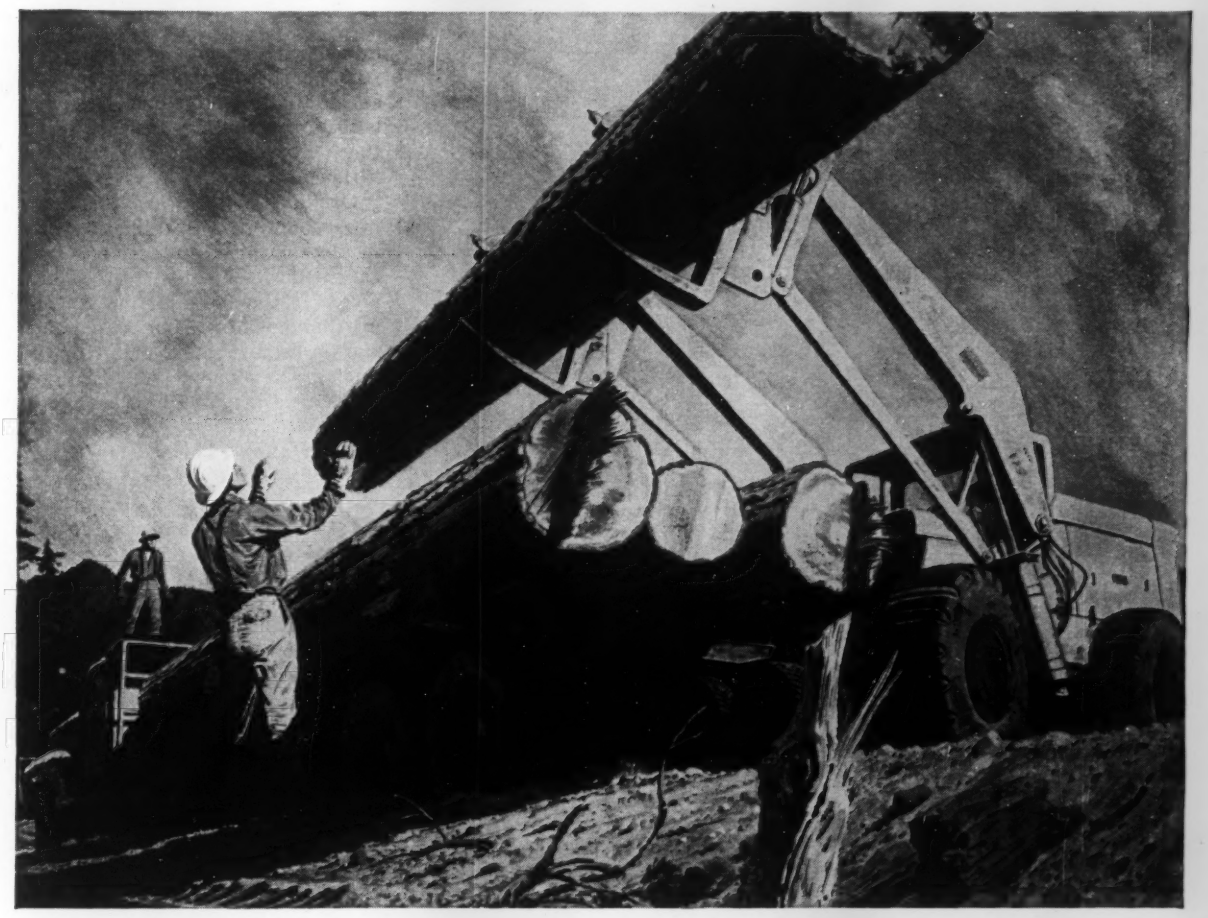
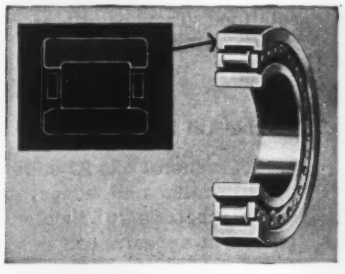


Fig. 3—Stresses in bar ground in 2.5 per cent soluble oil B



Loggers' "weight-lifter" tests bearing stamina!



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tained with essentially pure water (0.5 per cent rust inhibitor) are substantially the same as those with dry grinding indicates that the heat capacity of the fluid has little effect on the stresses.

Grinding stresses are the result of mechanical and thermal stresses in the workpiece associated with the removal of chips by the abrasive. If the benefit derived from a grinding fluid is due to a reduction in heat, it must come from reducing the amount of heat generated rather than carrying it away later.

Correlation—This view is consistent with the observation, based on single point machining experiments, that an appropriate gaseous atmosphere, incapable of carrying heat away from the cutting zone, can reduce friction and improve surface finish as well as the most effective liquids.

In metals, the workpiece apparently absorbs the surface heat so rapidly that any subsequent cooling by the liquid is of minor importance.

GRINDING FLUIDS USED IN TESTS

Rust Inhibitor A

Commercial type, probably containing about 40% $NaNO_2$ by weight in original concentrated solution. Transparent in appearance.

Soluble Oil B

18% mineral oil; 25 sulphonates, naphthenates and soaps; 5 other organic materials; 52 water. Transparent in appearance.

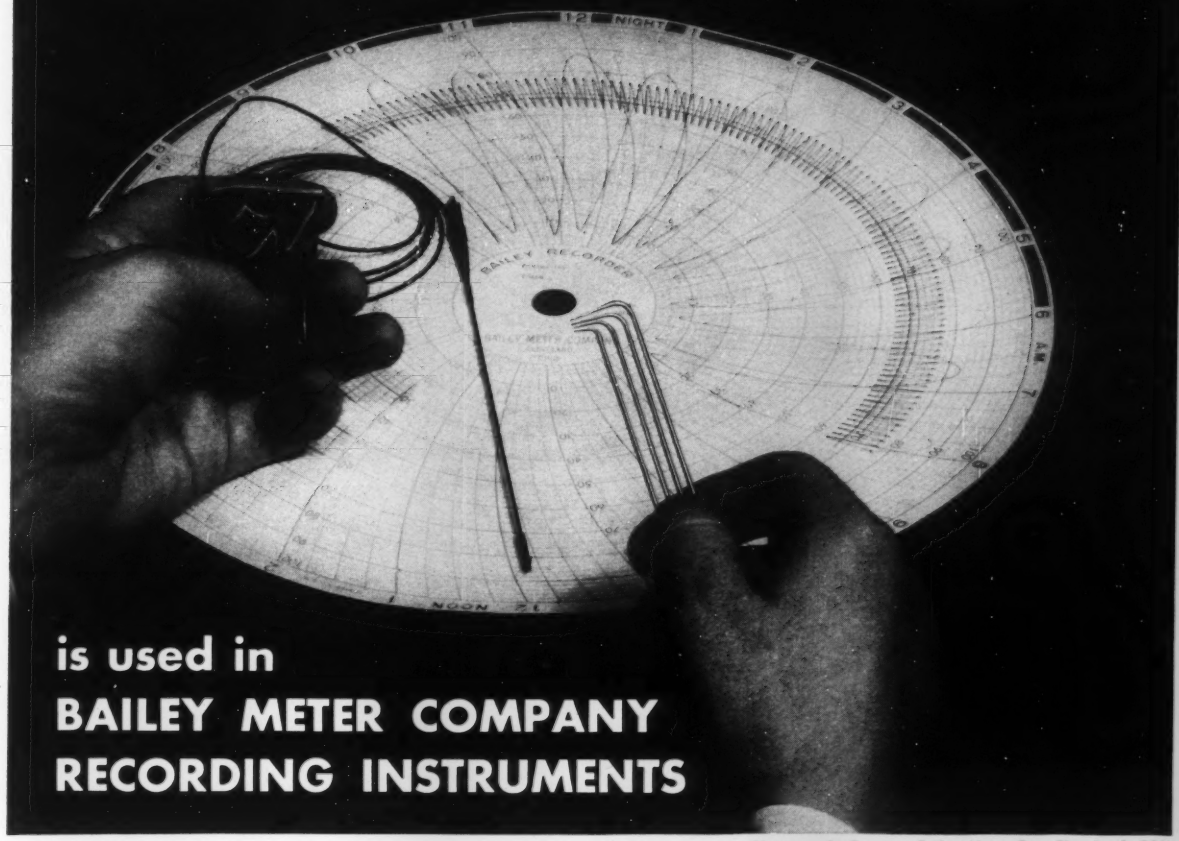
Soluble Oil C

3% mineral oil; 20 sulphonates, naphthenates and soaps; 23 other organic materials; 54 water. Translucent in appearance.

Soluble Oil D

65% mineral oil; 22 sulphonates,

BISHOP TUBING



is used in BAILEY METER COMPANY RECORDING INSTRUMENTS

Photograph, Courtesy Bailey Meter Co., Cleveland, Ohio

Bailey Meter Company selects Bishop *quality* #321 Seamless Stainless Tubing with a .125" O.D. x .010" I.D. for accurate, dependable and lasting performance.

In fact, almost all leading instrument makers use Bishop tubing in their products today.

When you need tubing LOOK NO FURTHER FOR QUALITY . . . specify Bishop tubing.

SEAMLESS AND WELDED AND DRAWN STAINLESS STEEL TUBING
(.008" to 1.000" O.D.)
(.003" to .083" Wall)

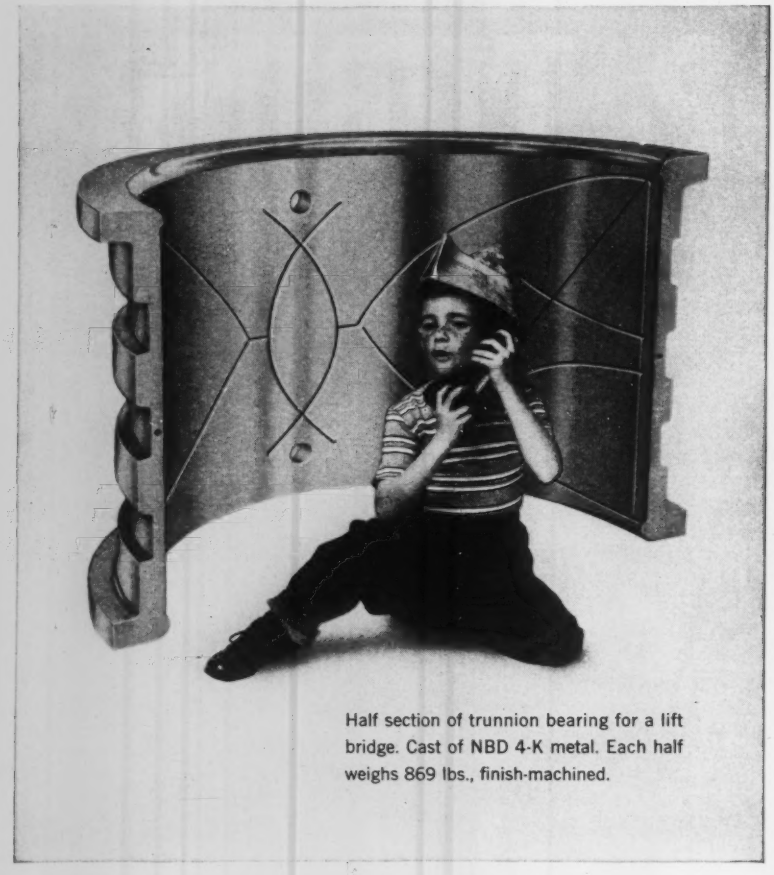
MECHANICAL, CAPILLARY, HYPODERMIC and AIRCRAFT GRADE NICKEL AND NICKEL ALLOY TUBING
(up to .625" O.D.)

Catalog and Quotations on Request. For prompt service and fast delivery call Malvern, Pa., 3100

STAINLESS STEEL PRODUCTS DIVISION

J. BISHOP & CO. Platinum Works

Malvern, Pennsylvania



Half section of trunnion bearing for a lift bridge. Cast of NBD 4-K metal. Each half weighs 869 lbs., finish-machined.

CALL IN **NBD**
FOR BIG **BRONZE**

Need "big bronze" like this, with oil holes and grooves cast right in? We cast and machine them to tolerances precisely held to your specifications. That's one advantage you gain through NBD's unsurpassed knowledge of casting techniques and machining facilities.

On smaller sizes or production runs, too, you can depend on top quality from NBD. Our specialty is bronze metallurgy . . . we've developed more than 40 special alloys. And we're completely equipped for shell-mold, cast-to-size, centrifugal casting . . . as well as sand casting.

For bearings, bushings, gear blanks, pump parts, call or write us for quotes or information.

AMERICAN Brake Shoe COMPANY

NATIONAL BEARING DIVISION
4930 Manchester Avenue • St. Louis 10, Missouri
PLANTS IN: CHICAGO • ST. LOUIS • MEADVILLE, PA.

GRINDING FLUIDS . . .

naphthenates, soaps and fatty materials; 4 other organic materials; 9 water. Milky in appearance.

Soluble Oil E

40% mineral oil; 38 sulphonates, naphthenates, and soaps; 6 fatty materials; 8 other organic materials; 8 water. Transparent in appearance.

Soluble Oil F

70% mineral oil; 24 sulphonates, naphthenates and soaps; 3 other organic materials; 3 water. Milky in appearance.

Soluble Oil G

66% mineral oil; 26 sulphonates, naphthenates and soaps; 8 water. Milky in appearance.

Grinding Oil H

Mineral oil with high chlorine content, about 15% by weight; no

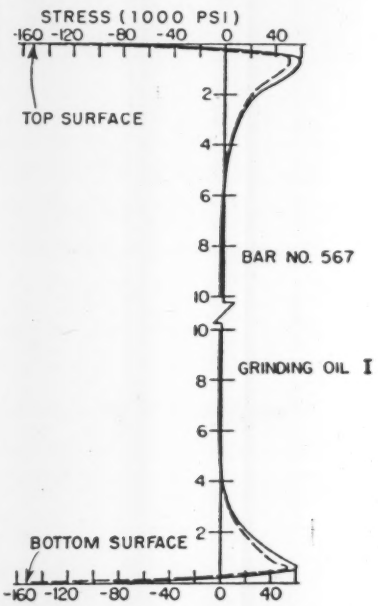
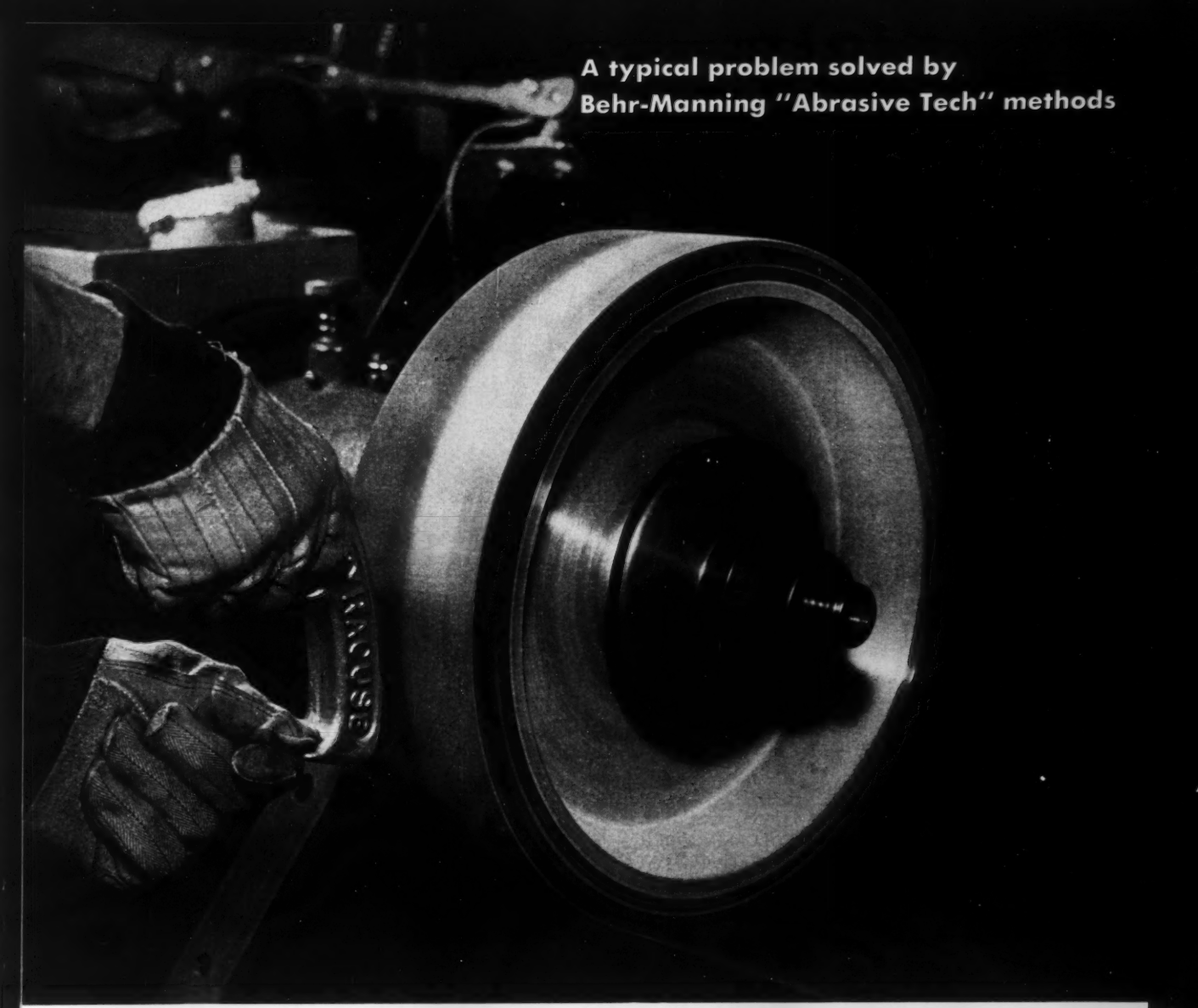


Fig. 4—Stress distribution in bar ground in grinding oil I



To grind *and* polish castings with one belt: Lubricate it with two greases of different weights. This permits stock removal on the light-greased half, polishing on the heavy-greased half, and you eliminate the extra step of changing to another belt. There are many such time-saving "Abrasive Tech" methods offered as a Behr-Manning service. Find out if there are any that can improve your production.

Very often a Behr-Manning methods engineer can provide a helping hand with different finishing problems. Just call the nearest Behr-Manning office for a date. There are 17 well-equipped "Abrasive Tech" Methods Rooms, available for problem-solving, or helping finishers brush up on new techniques: Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Detroit, Grand Rapids, High Point, Indianapolis, Los Angeles, Teterboro, Camden, San Francisco, Seattle, St. Louis, and Brantford, Canada. Main office and plant: Troy, N.Y.
For Export: Norton Behr-Manning Overseas Inc., Troy, N.Y., U.S.A.

BEHR-MANNING CO.

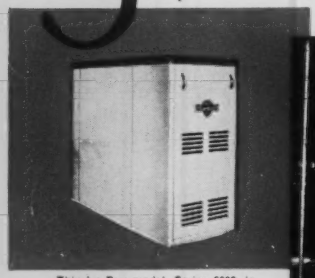
A DIVISION OF NORTON COMPANY

NORTON ABRASIVES

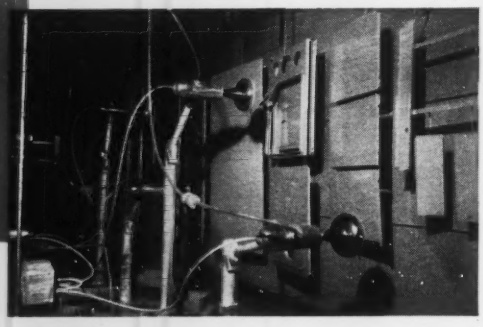
BEHR-MANNING PRODUCTS: Coated Abrasives • Sharpening Stones • Behr-cat Tapes
NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories

BEHR-MANNING ®

3 times as many Furnace Casings per gallon of paint with **RANSBURG NO. 2 PROCESS!**



This Lo Boy model, Series 6000, is typical of the Waterman-Waterbury line of winter air conditioners now painted electrostatically.



Quality of work is improved; Labor costs are cut and Production Stepped up 150% with

RANSBURG Electrostatic Spray Painting

Results exceeded expectations when Waterman-Waterbury, Minneapolis, modernized their finishing department and went from hand spray to Ransburg No. 2 Process in painting their quality line of heating and air conditioning equipment.

By the former hand spray method, W-W used a half gallon of paint to coat a single casing. Now, with Ransburg No. 2, they get SIX CASINGS PER GALLON . . . or 3 times as many per gallon. Furnace casings, as well as other painted parts which go into the famous Waterbury Furnaces, now get a uniform coating of .8-mil.

Production was increased, too, as automatic painting enabled them to step up the conveyor speed from 7 fpm to 11½ fpm. Where they formerly turned out a complete furnace in five minutes, NOW they assemble three in just six minutes . . . an increase of 150%. All in all, they figure the modernization program—with Electro-Coating—saved over $11,000 in the first three months of operation.

NO REASON WHY YOU CAN'T DO IT TOO!

Whatever you paint, we'd like to tell you more about the efficiencies and worthwhile savings which can be yours with Ransburg Electro-Coating Processes. Get our No. 2 Process brochure which cites many on-the-job examples of electrostatic spray painting on a wide variety of products. Or, we'll be happy to loan you our new film, "The Big Attraction" which tells the electrostatic spray painting story in sound and full color.

Call or write

RANSBURG
Electro-Coating Corp.
Barth and Sanders, Indianapolis 7, Indiana

GRINDING FLUIDS . . .

sulphur; about 13% fatty material; viscosity: 200 seconds Saybolt Universal (SSU).

Grinding Oil I

Sulphochlorinated mineral oil with high content of sulphochlorinated fats; about 3.5% sulphur; viscosity: 190 SSU.

Grinding Oil J

Mineral oil with sulphochlorinated fats; about 1.5% sulphur; viscosity: 190 SSU.

Grinding Oil K

Mineral oil with high fat content; no sulphur or chlorine; viscosity: 300 SSU.

Note: Appearance of fresh mixtures of the concentrations used: 0.5 and 10% for the rust inhibitor; 2.5 for the soluble oils. The transparent and translucent emulsions of soluble oils also became milky after use.

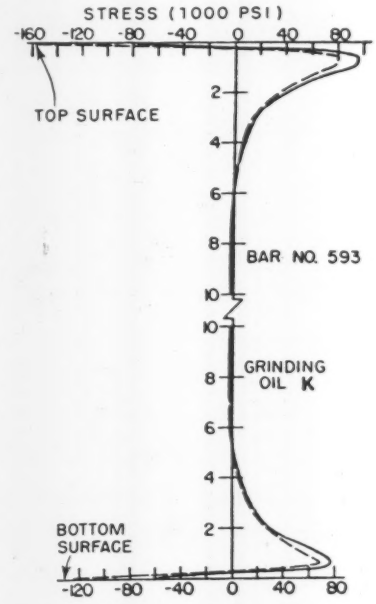


Fig. 5—Stress distribution in bar ground in grinding oil K

Press Brake Frame Designed with Wrap-Around Crown

Added resistance to deflection is provided by the wrap-around crown of this press brake's one-piece frame. It comes in 30 and 50-ton models with bed lengths of 6 to 12 ft.

The ram is inched down smoothly with an electro-pneumatic friction clutch and brake. Most of the weight of the clutch continues to rotate the flywheel between cycles. Only the driving plate is stopped.

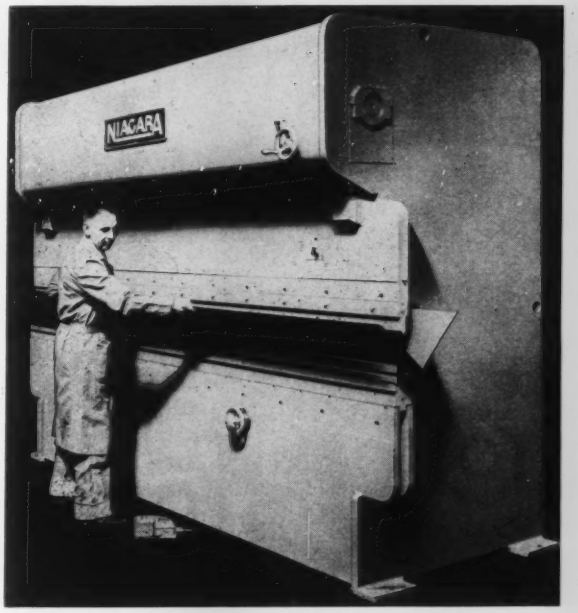
Control includes a portable power treadle, adjustable speed drive, and forward, reverse and stop button control.

The centralized pressure system of lubrication delivers oil to all main bearings, connection bearings and gibs.

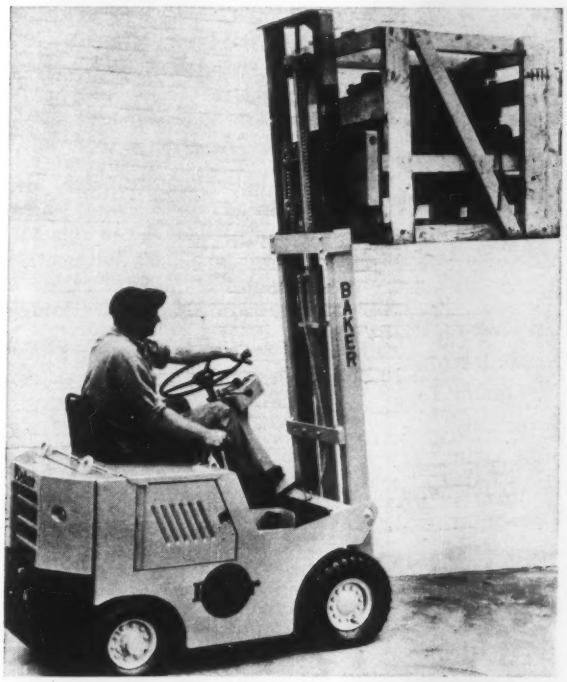
Micrometer counters at each end of the ram give accurate measurement (in thousandths) of adjustment and tilt.

Adjustable speed drive is reversible to pull the machine out of accidental stalls. It has a range of 20 to 50 strokes a minute.

The 30-ton model uses a 2-hp motor and the 50-ton model a 5-hp motor. *Write*: Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N.Y. *Phone*: Taylor 4070



LPG or Gasoline Powers 2000-Lb Lift Truck



Because of increased demand for trucks fueled with liquefied petroleum gas (see page 104), this manufacturer has added a 2000-lb model, FGF-20, to its line, which can be powered by an LPG or a gasoline engine.

The truck has pneumatic tires and a turning radius of only 71 in. It can turn into a 65 in. wide intersecting aisle.

Automotive type steering and controls, low accelerator angle, simple steering and clutch mechanisms, add to the ease of operation.

Maximum visibility is provided (there is no cowl). Outdoor work is possible. The unit has high underclearance and a 29-hp engine.

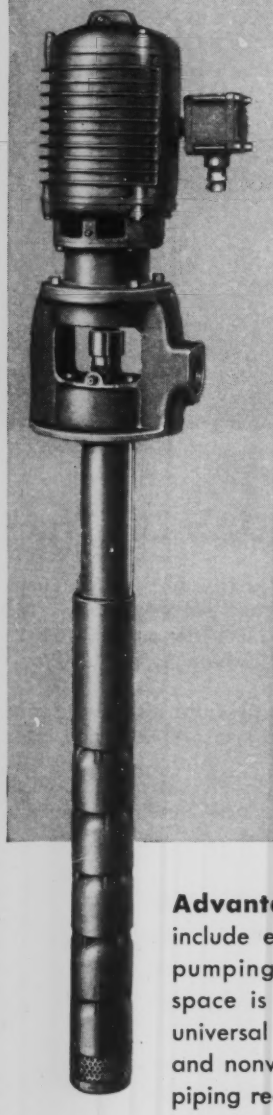
Self-adjusting service brakes, split bell clutch housing and a wide engine compartment opening make maintenance simple. The parking brake is independent. Travel speed is 11.2 miles an hour. Drawbar pull is 1500 lb.

With dual cylinders the free lift is 65¾-in. One cylinder lift is 11 in. Maximum tilt is 8 degrees forward, 10 degrees back.

The truck is 35½-in. wide. The standard height is 84½-in.; the truck loading model is 69½-in. high.

A full line of standard and special accessories are available. *Write*: Baker-Raulang Corp., Cleveland 2, O. *Phone*: Olympic 1-3000

WIDE VARIETY OF LIQUIDS HANDLED BY DEMING INDUSTRIAL SOLVENT PUMPS



TYPICAL LIQUIDS HANDLED

Acetone
Acetone & Amiplene
Acetate-Acetone
Acetate Anhydride
Alkaline Solution
Ammonia
Amylene
Anti-Freeze
Aviation Gasoline
Benzol
Benzine
Brines (Light)
Butanol
Caustic Soda
Coconut Oil
Diesel Oil
Ethanol
Ethyl Acetate
Ethyl Alcohol
Ethyl Ether
Fuel Oil
Hot Condensate
Hot Paraffin
Hydraulic Oil
Isopropyl Ether
Jet Fuel
Kerosene
Lanolin
Methyl Ethyl Ketone Solvent
Mineral Spirit
Monoethanolamine
Octo Alcohol
Pure Petroleum Naphtha
Sea Water
Sodium Hydroxide Solution
Solvesso
Styrene
Textile Finish Oil
Thinner
Toluene (Crude)
Toluene (Dry)
Vinyl Acetate
Xylene

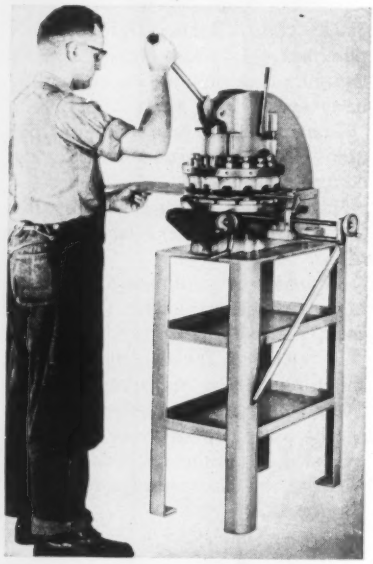
Advantages of Deming Fig. 4703 pumps include elimination of priming difficulties as the pumping unit is always submerged; minimum space is required due to vertical construction; universal application for handling both volatile and nonvolatile liquids; no close clearances; less piping required; low maintenance and operating cost. For complete information, write to:

THE DEMING COMPANY
535 BROADWAY • SALEM, OHIO

NEW PRODUCTS and equipment

Punch Press

This press has a throat depth of 12 in., over-all height of 25 in., width of 30 in. and depth of 20 in. A 2 in. hole can be punched in 16 gage mild sheet by this 4-ton capacity machine.

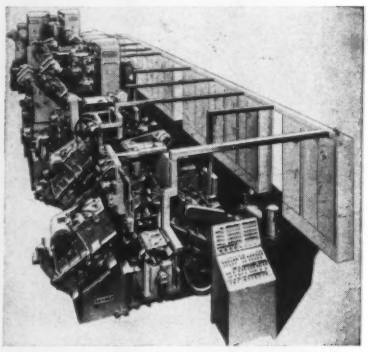


Holes can be punched in thin sheet material without distortion or burr. A selection of round, square, oval, rectangular and notching punches and dies can be used. *Write*: O'Neil-Irwin Mfg. Co., 619 Eighth Ave., Lake City, Minn. *Phone*: 6311

Transfer Machine

Three individual transfer machines that add up to a total length of 230 ft are combined in this 175 ft unit that machines automotive intake manifolds.

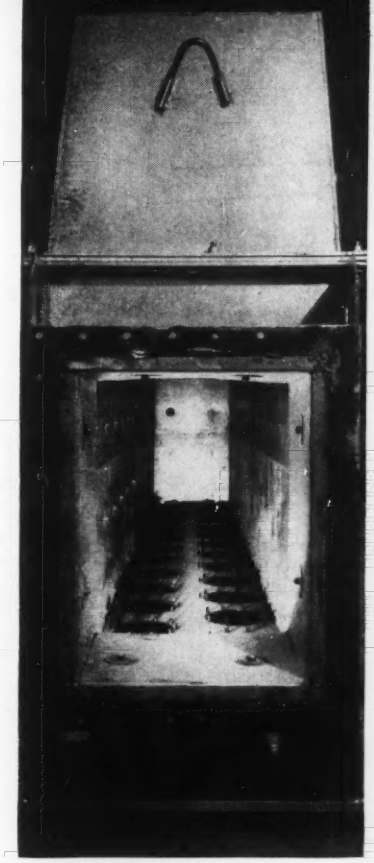
The operation takes the rough



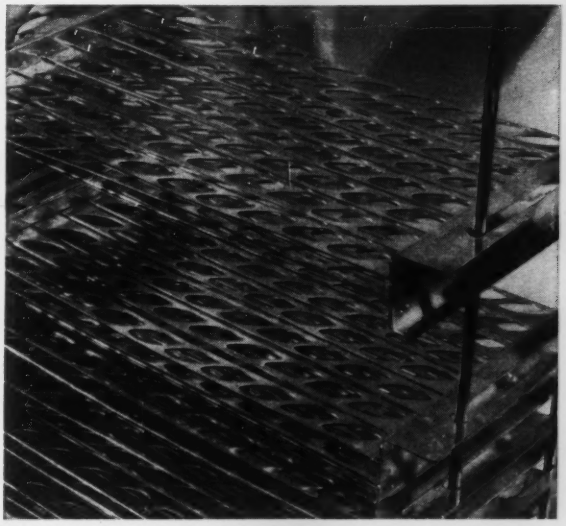
NOTHING can equal Stainless Steel

in its unique combination of properties

No other design material can match Stainless Steel in its combination of desirable properties: corrosion resistance, strength, hardness, beauty, cleanability and easy fabrication. For a reliable source of supply, United States Steel offers you the widest range of types, finishes and sizes. **Just call your steel warehouse.**

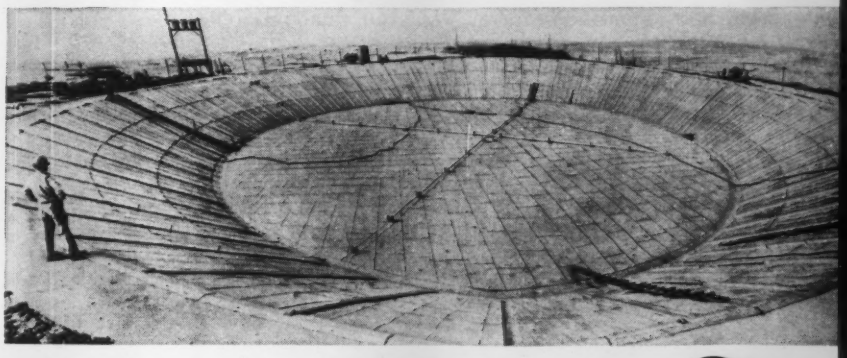


For High Temperatures. This recuperator is used on industrial furnaces. It uses waste flue gas to heat the incoming furnace air and thereby increase the efficiency of the furnace. Formerly, these recuperators were made with ceramic tubes, but heat transfer was low and leakage was high. The Hazen Engineering Company in Pittsburgh makes recuperators almost completely from Stainless Steel. Compared to ceramic designs, the Stainless design saves about 40% in fuel, increases furnace output about 10%-15%. The Stainless Steel performs well, even at this 1800-2300° F. temperature range.



For Cleanliness. When you work near nuclear radiation areas, you wear a small badge containing X-ray film that records how much radiation you have received. The film, "photodosimetric film," is developed in a Sensitometric Processing Unit made by Bar-Ray Products, Inc., in Brooklyn. The unit, including the trays shown here, is made completely from 18-gage Type 316 Stainless Steel because it resists corrosion, is easy to clean, has a hard, dense surface that doesn't harbor dirt.

For Corrosion Resistance. The Hercules Powder Company needed an ammonium nitrate storage tank for their plant near Richmond, California. They took an old, World War I concrete reservoir and lined it with Type 304 USS Stainless Steel. The 14-gage sheets are laced with 18,000 feet of vacuum-tested welds. Tank holds two **million** gallons of solution, and is 200 feet in diameter at the top. U. S. Steel's Consolidated Western Division handled the complete installation.



United States Steel Corporation, Pittsburgh • American Steel & Wire Division, Cleveland
Columbia-Geneva Steel Division, San Francisco • National Tube Division, Pittsburgh
Tennessee Coal & Iron Division, Fairfield, Ala.
United States Steel Supply Division, Warehouse Distributors
United States Steel Export Company, New York

USS STAINLESS STEEL

SHEETS • STRIP • PLATES • BARS • BILLETS • PIPE • TUBES • WIRE • SPECIAL SECTIONS

UNITED STATES STEEL

This alloy "shopping list" saves many a day for busy metallurgists!

AISI		AMS			SAE	
302	410	5333	5376	5631	30302	51442
303	414	5334	5378	5640	30303	51446
304	416	5350	5380	5643	30303F	60303A
308	420	5351	5382	5645	30304	60304
309	430	5352	5385	5665	30310	60310
309+W	430F	5354	5386	5700	30316	60316
310	431	5355	5388	5710	30321	60347
316	431A	5358	5389	5735	30347	60410
321	436	5360	5392	5765	51410	60420
327	440A	5361	5393	6270F	51414	60442
329	440B	5362	5394	6274F	51416F	60446
330	440C	5363	5526	6280C	51420	70310
331	440F	5366	5537	6350	51430	70310A
347	442	5369	5610E	6382	51431	70327
403	446	5370	5616	6428	51440A	70330
406		5372	5621	7834	51440B	70331
		5373	5628		51440C	70446
		5375	5630		51440F	

MISCELLANEOUS

Armco 17-4PH • GMR 235 • Inconel* • Invar • Monel* • NiResist* IA NiResist* IIA • NiResist* III • Waspalloy

*® International Nickel Co.

You name the alloy... we'll produce to your specs. —in record time!

THE watchword of CANNON-MUSKEGON is "CONTROL." Careful selection of the finest raw materials . . . rigid melting procedures . . . complete chemical and physical testing facilities, plus closely supervised handling — produce alloys to your most exacting standards. More than 100 special and standard alloy analyses are produced each year.

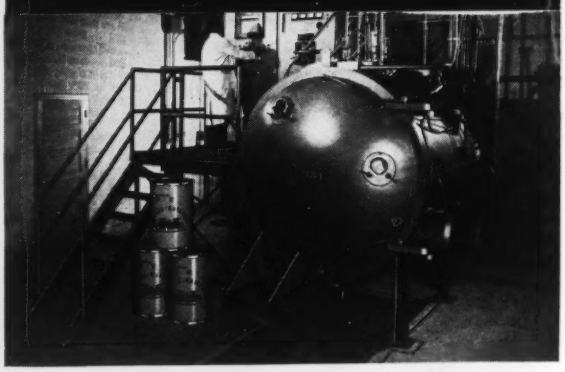
The alloy list above is typical of production "regulars" for scores of users in all industrial fields. If you don't see what you need — remember, our facilities are open to "tailor" alloys to your specific needs. We'll also recommend proper in-plant handling and heat treating procedures to assure the desired physical and chemical properties in your final product.

FOR IMMEDIATE REFERENCE — write for your personal copy of Cannon-Muskegon's 6-page handbook for metallurgists, giving you data on both UltraMet and MasterMet alloy service.

ULTRA MET VACUUM-MELTED ALLOYS FOR INDUSTRY

MASTER MET CERTIFIED ALLOYS FOR INDUSTRY

and CANNON-MUSKEGON offers you both vacuum and air-melting facilities for cobalt-, ferrous- and nickel-base alloys in a wide variety of cast forms



UltraMet alloys are produced in this latest design vacuum melting furnace — production center for a virtually unlimited variety of high temperature, corrosion resistant alloys for severe-stress applications.

CANNON-MUSKEGON CORPORATION

2893 Lincoln Avenue • Muskegon, Michigan, U.S.A.

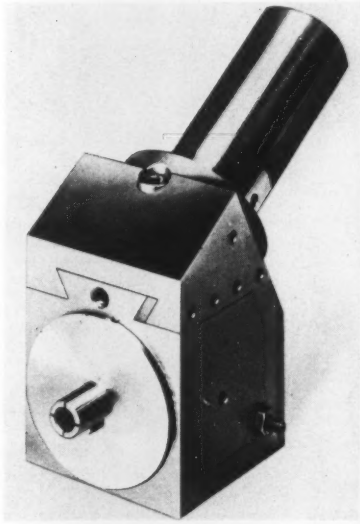
METALLURGICAL SPECIALISTS

casting and makes a finished part of it. It produces 136 manifolds an hour.

Two 29-station milling machines run in parallel and feed their output through a third 32-station transfer drilling machine to remove 18 lb of metal from each 70 lb part. *Write*: Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich. *Phone*: Lorain 7-0123

Radial Marking

These automatic roll markers can stamp the end surfaces of production parts during the machining cycle. They can be mounted in line with reference to the true pitch diameter.



Accurate marking dimensions result since the roll markers operate on the same centers as the parts being machined. *Write*: New Method Steel Stamps Inc., 149 Jos. Campau St., Detroit 7, Mich. *Phone*: Lorain 7-4235

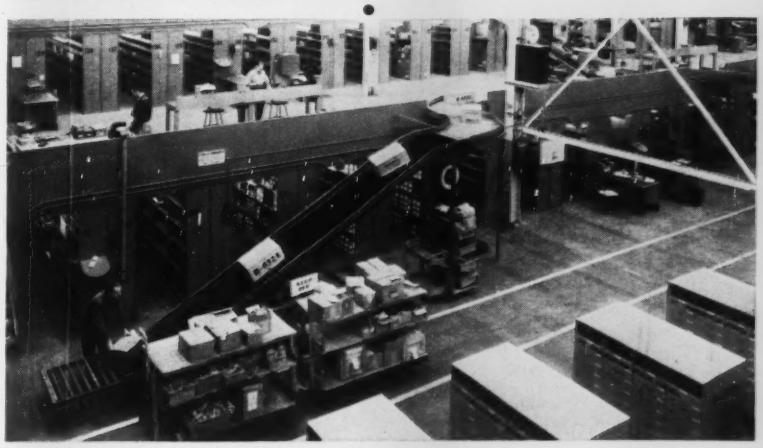
Roller Bearing Assembly

This machine automatically gages the diameter and flange thickness of the inner race, selects the proper number of rolls from one of six preselected size hoppers and automatically assembles race, rollers and cage into a bearing of predetermined tolerance.

The bearing is checked for

Ask Standard

how to cut costs with conveyors



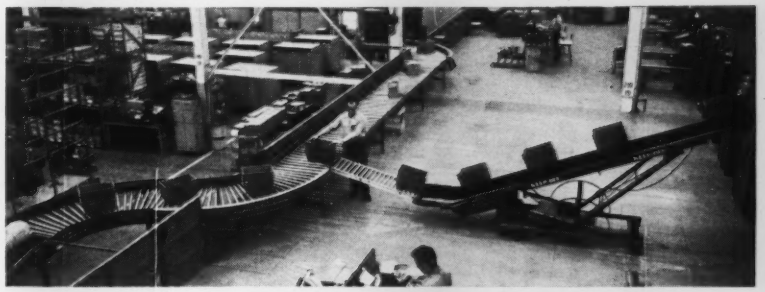
One of two Inclinebelt conveyors that carry parts to reversible live roller conveyor at second level. Belt conveyors are reversible to bring down outgoing parts. Note minimum space used for conveyors.

Multi-level conveyors help Douglas Aircraft CUT STORAGE AREA BY 2/3

When it's difficult to spread out — look up! That's what the El Segundo Division of Douglas Aircraft did when confronted with the need to triple the capacity of a parts stockroom facility.

Today, instead of stocking parts on one level, they're using three. Movement of parts in and out of all three levels is quick, simple and efficient. They're doing it with Standard conveyors.

This relatively simple solution to what could have been a difficult problem is one example of how Standard Conveyors pay off in every industry. STANDARD CONVEYOR COMPANY, North St. Paul 9, Minnesota. Sales and Service in Principal Cities.



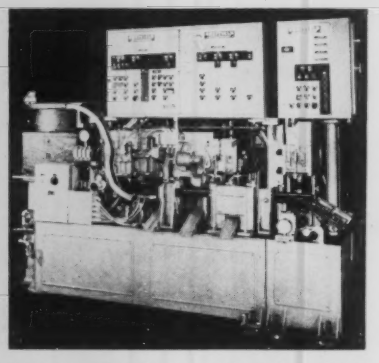
Third level is reached via portable Handibelt conveyor from reversible live roller conveyor. Patented easy-adjustment features of Handibelt permit quick reversing of flow.

For details on Standard Conveyors, help in selecting the right type and size to meet your needs, contact the Standard representative listed in your classified phone book or write direct. Ask for Bulletin Y-7.

Standard 50 years of conveyor experience

GRAVITY & POWER CONVEYORS

NEW PRODUCTS and equipment



torque, standout and noise level and segregated as acceptable or reject. *Write*: Sheffield Corp., Dayton 1, O. *Phone*: Kenmore 3131

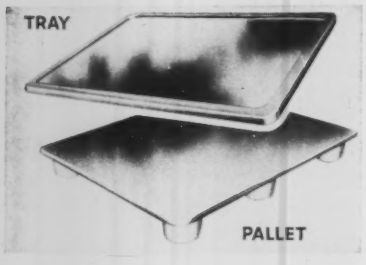
Refractory Coating

This coating for steel ingot stools, slag pots, and ingot buggy couplings can be applied to hot metal surfaces (700°F) without curling. It shields metal surfaces that come in contact with molten metal and slag.

Its principal ingredients are graphite, calcined aggregates and selected minerals. It is shipped in 50 and 100-lb packages. *Write*: Refractories Division, H. K. Porter Company Inc., 2500 First National Bank Bldg., Pittsburgh, Pa. *Phone*: Express 1-0434

Plastic Pallets

Lightweight pallets, skids, shipping trays and assembly line trays made of plastics are easily cleaned.



These pallets have high tensile and impact strength. *Write*: Paltier Corp., 1701 Kentucky St., Michigan City, Ind. *Phone*: Triangle 2-7238

Thermometers

These instruments are used as surface or flush-mounted units. The over-all dimensions are 16¾ x 14 x 8⅜-in.

The temperature range is from −40 to 950°F.

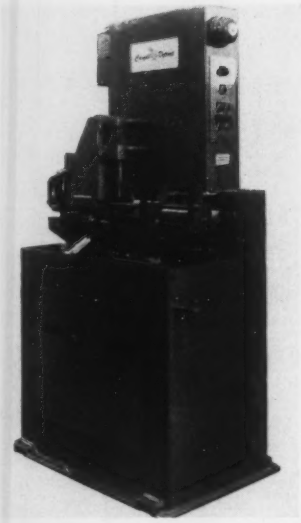
The indicator scale is approximately 7½-in. long.

The set point and controlled variable are both indicated. *Write*: Barber-Colman Co., Rockford, Ill. *Phone*: 4-7871

3000-Lb Test Unit

The strength of brazed joints in automotive valve lifters can be tested automatically on this high speed ram test unit at the rate of 1800 an hour.

Faulty parts are rejected automatically.



Similar machines can be used for functional leak down test for the proper fit of a plunger in a valve body. *Write*: Cargill Detroit Corp., Birmingham, Mich. *Phone*: Midwest 4-5400

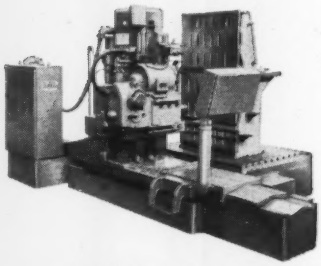
Hard Surfacing Material

Dril-Tec 86, 88 and 89 are hard surfacing alloys that deposit tungsten carbides on steel, cast iron or copper alloys.

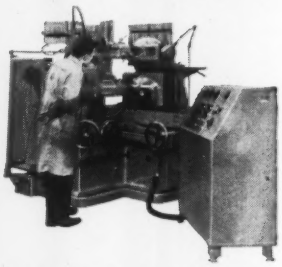
They are used to prepare cutting or wear surfaces on equipment used for drilling, boring, reaming,

(Advertisement)

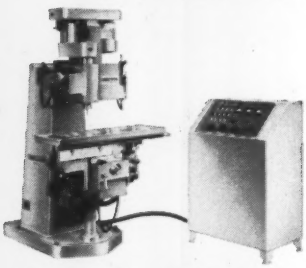
A P&W Tracer-Controlled MILLER FOR EVERY JOB



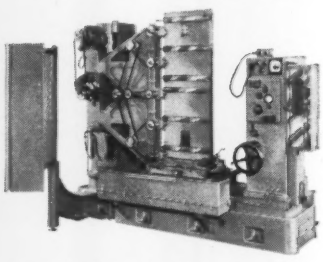
KELLER TYPE BG-21 . . . a powerful, versatile machine in a range of sizes from 5′ x 2½′ to 10′ x 4′, in single and 2-spindle models.



KELLER TYPE BL . . . a compact, powerful Tracer-Controlled Miller for work within the range of 36″ x 20″. With all new Keller features. Single and 3-spindle models.



VELVETRACE® MILLING MACHINE . . . duplicates the finest detail with extreme precision. New, non-contacting tracer control cannot damage the softest, most fragile 3-dimensional models.



AUTOMATIC DUPLICATION MACHINES . . . automatically reproduces original forging dies and glass or plastic molds with remarkable precision and detail. Two versions, one for molds, one for dies, with 1, 2 or 4 spindles.

PHOTO COURTESY OF ALUMINUM COMPANY OF AMERICA

To machine the WORLD'S LARGEST DIE,

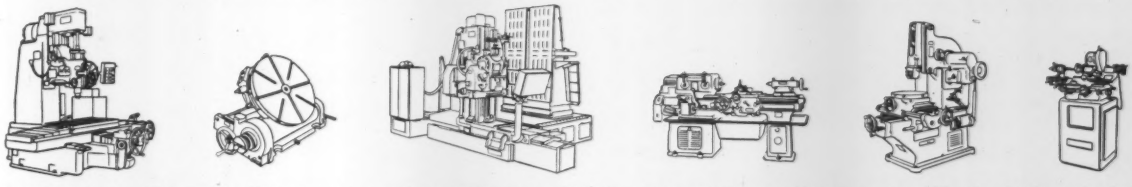
ALCOA chose the Keller . . .

. . . AUTOMATIC TRACER-CONTROLLED MILLING MACHINE

Consisting of two halves, each weighing 30 tons, this is the world's largest closed die block. Designed to forge aluminum backbones of fuselage and wing structures for the new multi-jet Martin SeaMaster, this giant die was produced on a P&W Keller BG-22 at the U.S. Air Force Heavy Press Plant operated by Aluminum Company of America.

Chances are that your own workpieces aren't as large as this die, but there is a Pratt & Whitney Keller Automatic Tracer-Controlled Miller for *every* worksize requirement. *Every* Keller Machine offers the same important advantages: fast, accurate reproduction of complex 3-dimensional shapes, extreme versatility and an overall ability to produce highest work quality economically. These advantages will also make Keller *your* first choice for a wide variety of die, mold and other hard-to-handle 2- and 3-dimensional milling jobs. Write now for complete information.

Pratt & Whitney Company, Incorporated, 13 Charter Oak Boulevard, West Hartford, Conn.



JIG BORERS . . . ROTARY TABLES . . . KELLER MACHINES . . . LATHES . . . VERTICAL SHAPERS . . . CUTTER AND RADIUS GRINDERS

PRATT & WHITNEY

FIRST CHOICE FOR ACCURACY

MACHINE TOOLS • GAGES • CUTTING TOOLS

earth removing and coring tools.

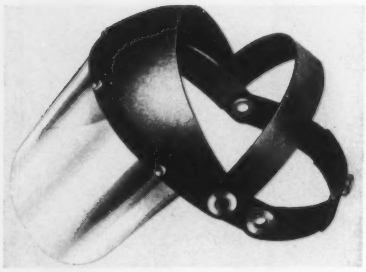
The bonding temperatures are low (in the 1570 to 1670°F range). The parent material upon which the Dril-Tec is applied will not be distorted as a result of the low application heat required. *Write*: Eutectic Welding Alloys Corp., 40-40 172nd St., Flushing 58, N.Y. *Phone*: Flushing 8-4000

Welding Helmets

Radiant heat protection is provided by a cellulose acetate face shield window.

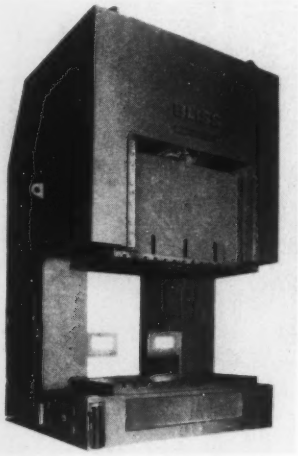
More than 70 per cent of the radiant heat is reflected.

Some other suggested applications: Furnace operations, melting, forging and metal pouring. *Write*: Safety Products Division, American Optical Co., Southbridge, Mass. *Phone*: Porter 4-3211



Gap Frame Press

This 200-ton press pierces rear fenders for automobiles. The single action press has an eccentric drive and a one-piece frame.

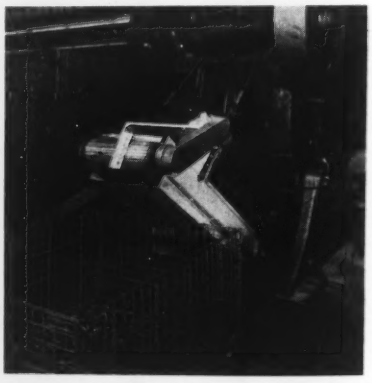


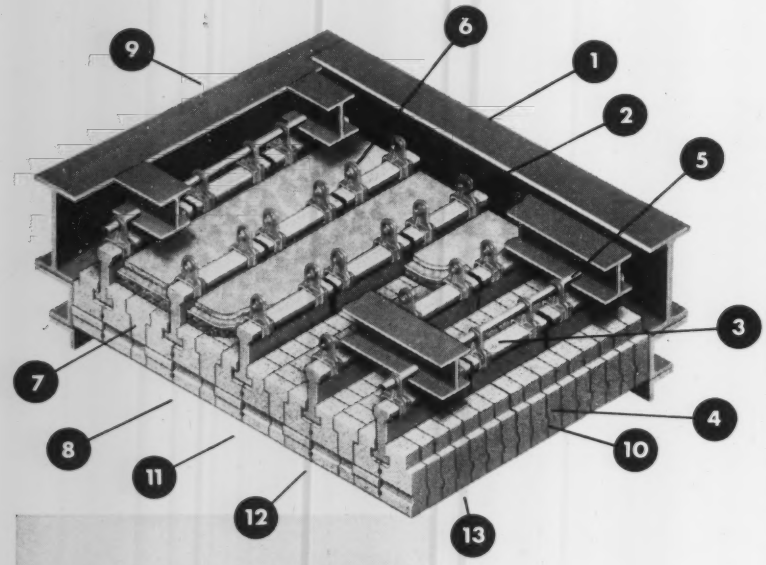
Filtered oil lubrication for the entire press is automatic.

The slide is arranged for three-bar knockout. *Write*: E. W. Bliss Co., Canton, O. *Phone*: 7-3421

Conveyor

Stampings, forgings, castings and small parts are handled by this conveyor. It comes in 8, 12 and 16 in. widths. Special widths may be had on request.





HOW TO STOP HEAT FROM RAISING THE ROOF

1. Unit-suspended construction
2. Supporting casting
3. First quality refractory holding tile
4. First quality or special refractory service tile
5. 1¼" pipe
6. Insulating seal
7. Filler tile
8. No cumulative expansion
9. For metallurgical furnaces
10. Ample tile offsets
11. Individually engineered—easy-to-follow drawings
12. Minimum heat loss
13. Maximum service life

Here's the Bigelow-Liptak arch design for a soaking pit cover. It features unit-suspended construction for stability, long life and easy maintenance.* Write for complete information.

*A similar arch installed in a mid-western steel mill has been in action for seven years without shut down.

BIGELOW-LIPTAK Corporation
AND BIGELOW-LIPTAK EXPORT CORPORATION
13300 PURITAN AVENUE, DETROIT 27, MICHIGAN
UNIT-SUSPENDED WALLS AND ARCHES
In Canada: BIGELOW-LIPTAK OF CANADA, LTD., Toronto, Ontario
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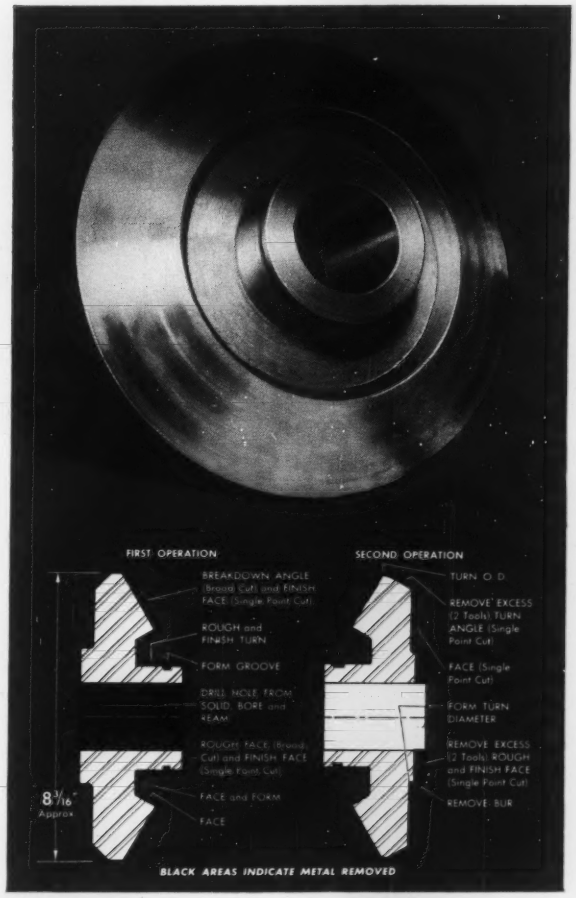

FIRST OPERATION
SECOND OPERATION
BREAKDOWN ANGLE (Broach Cut) and FINISH FACE (Single Point Cut)
ROUGH and FINISH TURN
FORM GROOVE
DRILL HOLE FROM SOLID, BORE and REAM
ROUGH FACE (Broach Cut) and FINISH FACE (Single Point Cut)
FACE and FORM
FACE
TURN O. D.
REMOVE EXCESS (2 Tools) TURN ANGLE (Single Point Cut)
FACE (Single Point Cut)
FORM TURN DIAMETER
REMOVE EXCESS (2 Tools) ROUGH and FINISH FACE (Single Point Cut)
REMOVE BUR
8 3/16" Approx
BLACK AREAS INDICATE METAL REMOVED

Let me show you how one of our P & J Automatics

put this

"PROBLEM" Job on a PAYING BASIS!

Some of the toughest machining jobs you'll ever have to handle get that way, *not* because of any *single* factor like extra-hard metal or really heavy cutting, but because of *several* contributing factors that can add up to a lot of machining time and a big profit loss. The job shown here . . . which one of our customers brought in recently . . . is a good example. A glance at the "Job Facts" will show you a combination of factors that could easily have made this job a real problem. The most difficult of these requirements was machining the bevels . . . which had to meet close tolerances for size and conformity to the true angle and, in addition, demanded a fine finish with *no* tool-return marks permitted. However, handling this part on a Potter & Johnston 4-U Automatic, with a tooling set-up engineered by P&J Tooling Specialists, put this potential headache on a high-output, high-profit basis.

HERE ARE THE JOB FACTS:

PART: *Bevel Gear*

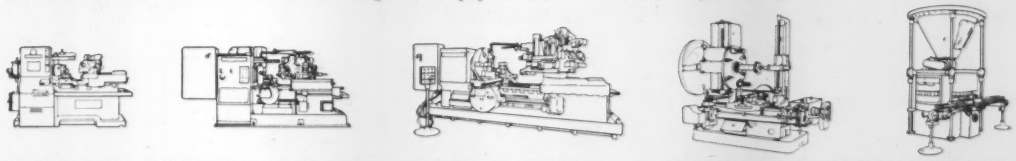
MATERIAL: *Steel Forging, 190 Brinell*

MACHINING REQUIRED: *22 separate roughing and finishing cuts including several hard-to-handle angle cuts.*

SPECIAL REQUIREMENTS: *Hold bevel angles to close tolerances and produce a good finish.*

RESULTS: *A part finished every 13 minutes floor-to-floor time . . . on a P&J 4-U Automatic!*

A new P&J Automatic can put *your* problem jobs on a paying basis too! Send me your sample prints and I'll show you how a P&J Automatic with P&J Tooling can help you turn out your toughest jobs faster, better and at lower cost. Write Potter & Johnston Company, Pawtucket, Rhode Island.



AUTOMATIC TURRET LATHES . . . GEAR CUTTERS . . . GILDA PACKAGING MACHINES

POTTER & JOHNSTON

SUBSIDIARY OF PRATT & WHITNEY COMPANY, INC.

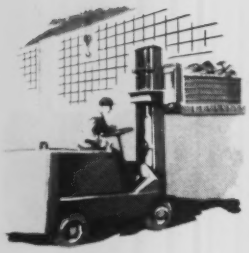
PRECISION PRODUCTION TOOLING SINCE 1898

The world of science behind
EXIDE-IRONCLAD BATTERIES

Being interviewed is Curtice C. White, Senior Development Engineer.

"These channels actually cool the battery"

At the Exide Laboratories—**Reporter:** First, Mr. White, tell me what makes a battery hot.



White: Heavy loads—they often raise battery temperature as much as 20 degrees.

Reporter: How do the channels cool it?

White: The heated electrolyte rises to the top through the channels. Plates are cooled by electrolyte coming up from the bottom.

Reporter: Don't all batteries have channels?

White: Unfortunately, no. It is the tubular construction of the Exide-Ironclad positive plate that leaves these channels on both sides.

Reporter: What does this feature mean in battery performance?

White: Longer battery life, for one thing. The battery stays cooler. Has less incidence of hot spots. Plates operate at a more uniform temperature.

Reporter: Obviously this is an important feature of Exide-Ironclad.

White: Yes it is, but it's just one of many engineering details that contribute to its high capacity and long life.

Note to battery users: Whenever you order heavy duty batteries or the equipment that requires them, be sure to specify Exide-Ironclad. For detailed bulletin, write Exide Industrial Division, The Electric Storage Battery Co., Philadelphia 2, Pa.

THE ELECTRIC STORAGE BATTERY COMPANY **Exide®**

It can be used between machines or from machine to storage or scrap container to eliminate costly double handling.

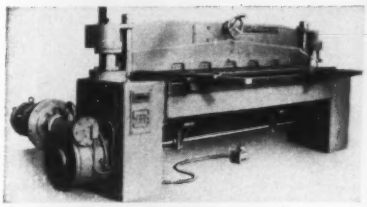
The drive unit is powered by a gearhead motor with roller chain drive to head pulley. The normal belt speed is 60 ft a minute. *Write*: Belt Corp., 810 Stahl Road, Orient, O.

Shears

Ordinary and close tolerance shearing of sheet metal is the function of this machine. It handles sheets up to 15 ft long and 1¼-in. thick.

A device recessed in the table allows easy and safe fastening and adjusting of the lower blade by the operator.

It saves the operator's time in changing blades.



Standard stops and gages are provided for parallel and square cuts. *Write*: New Equipment Division, S. & S. Machinery Co., 140 53rd St., Brooklyn 32, N.Y. *Phone*: Hyacinth 2-7400

Variable Speed Drive

Various input signals automatically control this multiple drive system.

The system makes it possible to automatically change the speeds of several motors equally and simultaneously.

Dripproof, totally enclosed motors are available in speeds from 1 to 10,000 rpm. *Write*: U.S. Electrical Motors Inc., Box 2058, Terminal Annex, Los Angeles 54, Calif. *Phone*: Richmond 9-9029

High Vacuum Furnace

A vacuum of 0.01 to 0.05 micron is maintained in this electrically

PHOTO COURTESY OF THE WALLINGFORD STEEL CO., WALLINGFORD, CONN.

CONTROLLED ACCURACY

to ±.0001 inch at 800 ft. per minute*

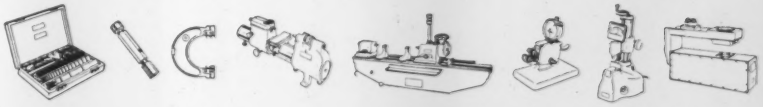
. . . WITH PRATT & WHITNEY AUTOMATION GAGING

Here's an automation gaging installation which provides fully automatic correction of a mill that rolls at speeds of more than 800 feet per minute and produces steel strip as thin as 0.002". Results that rate a mention – and your consideration – include . . . greater accuracy . . . finer product quality . . . lower production costs . . . and the near-elimination of scrap losses.

Whether your interest is continuous or parts production, Pratt & Whitney Automation Gaging can play an important role in improving your product quality and reducing your unit costs by increasing your units per production hour.

**Equal to 1/30th the thickness of a human hair.*

Write for additional information
Pratt & Whitney Company, Incorporated
13 Charter Oak Boulevard, West Hartford, Conn.



GAGE BLOCKS . . . STANDARD MEASURING MACHINES . . . SUPERMICROMETERS . . . COMPARATORS
CONVENTIONAL GAGES . . . THREAD COMPARATORS . . . AUTOMATION AND CONTINUOUS GAGES

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CLAYMONT can handle
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large quantity head orders —and DELIVER ON TIME!

Claymont is uniquely well-equipped to handle the really big jobs quickly. We have a 3000-ton press to do the job.

SIZES AND SHAPES? This big press can form heads up to 120 inches in diameter. And our recently installed furnaces have increased our maximum gauge capacity to as high as 4 inches on certain sizes of heads.

Naturally, press dies have to be changed every time we change head diameter or shape. Claymont now has on hand a number of dies of different sizes in flanged and dished, hemispherical and elliptical shapes. Perhaps you can use one of these sizes or shapes. If so, you'll get faster delivery on your head orders than you've ever experienced.

METALS? Besides carbon, alloy, stainless and stainless-clad steels, Claymont regularly forms heads from aluminum, brass, bronze, copper, nickel, Inconel and Monel metals.

QUALITY? Claymont head quality is second to none. Here's one example that we think speaks for itself: when a 123″ two-piece conical head was ordered by one of Claymont's regular customers, they asked that the weld be marked—because it had been impossible to detect the weld location on a previous order.

NEED ONLY A FEW HEADS? Claymont is still one of your best sources. We will continue to produce small orders in a variety of sizes on all our forming equipment . . . the 3000-ton press, the recently modernized 1600-ton press, and the spinning machines with capacities up to nineteen feet. What's more, we maintain head stocks in many popular sizes and shapes for immediate delivery.

Whether your order is large or small, we'd like to discuss your requirements with you. Just contact our nearest sales office.

5057

OTHER CLAYMONT PRODUCTS

Alloy Steel Plates • Stainless-Clad Plates • Clay-Loy® High Strength Low Alloy Steel Plates
Large Diameter Welded Steel Pipe • Fabricated Steel Parts • Manhole Fittings and Covers

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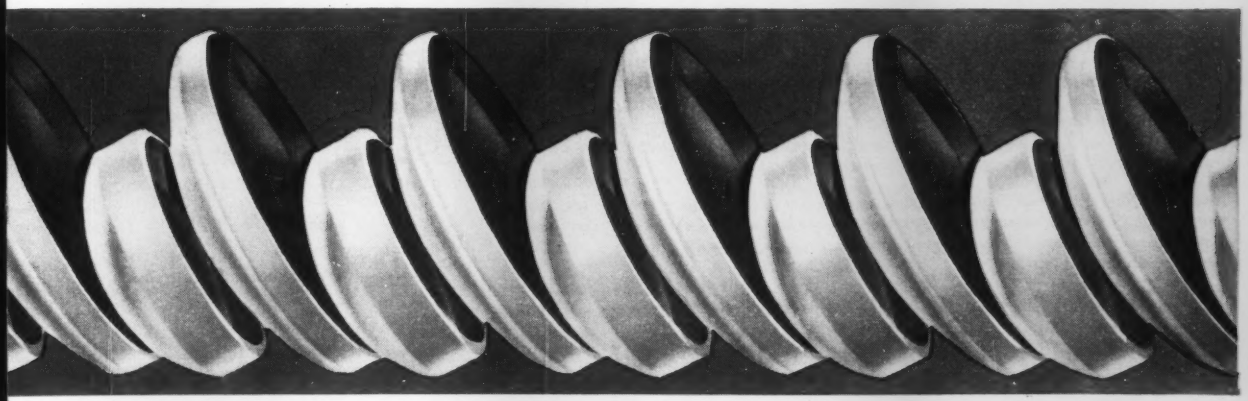
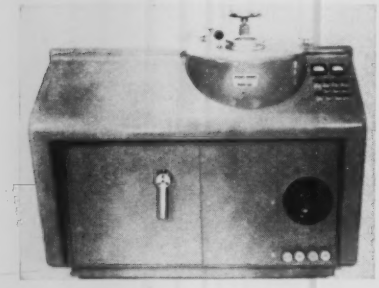
CF&I OFFICES IN CANADA: Montreal • Toronto **CANADIAN REPRESENTATIVES AT:** Calgary • Edmonton • Vancouver • Winnipeg



NEW PRODUCTS and equipment

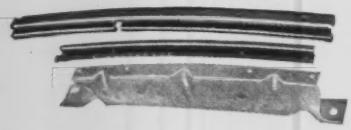


heated furnace for continuous operation at 4000°F. It is used for sintering, brazing, bright annealing and melting.

It has a sight tube for an optical pyrometer so that the cover stays in place during temperature readings.

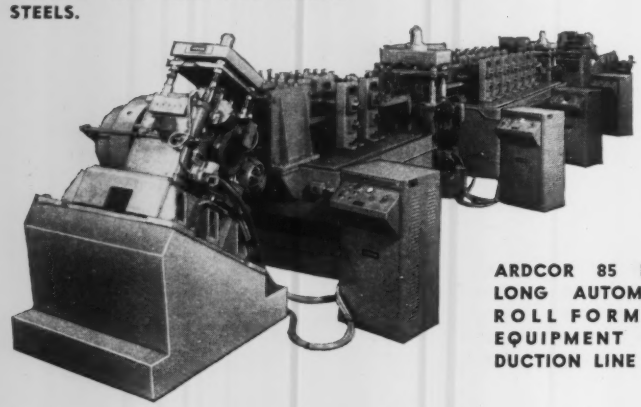
The furnace, power supply and two vacuum pumps are packaged in one cabinet. *Write*: Vacuum Furnace Division, Richard D. Brew & Co. Inc., Airport road, Concord, N.H. *Phone*: Capitol 5-6606

High Speed Roll Forming . . . TIMED IN SECONDS!



UPPER AND LOWER SEAT TRACKS COMPLETELY ROLL FORMED, PIERCED AND COILED 1½ FEET IN LENGTH; .078 AND .106 GAUGE STEELS.

. . . UP TO 45 SEAT TRACKS PER MINUTE, Roll Formed, Pierced, Coiled and Cutoff on this ARDCOR Completely Automated Production Line.



ARDCOR 85 FOOT LONG AUTOMATED ROLL FORMING EQUIPMENT PRODUCTION LINE

ARDCOR Roll Forming Equipment, now used by one of America's leading Automotive Manufacturers, for roll forming Upper and Lower Seat Tracks for 1957 model cars.

Starting from the coil box (in the background of the photo above), the stock travels at high speed through a succession of operations including Leveller, First Pre-Notcher, Forming Mill Passes, Second Pre-Notcher, Two-Drive Coiling Fixture, to the Cutoff Press shown in the foreground. Four Pulpit Control Stands are located at the two Pre-Notching Stations, Forming Mill, and Cutoff Press, giving the operators completely automated or emergency control at every station.

Throughout the metal working industry, modern roll forming methods are giving faster production with new and important economies. Let ARDCOR standard or special design Roll Forming Equipment introduce these new and improved production advantages in your plant.

Consult our Engineering Facilities, without obligation . . .

ARDCOR Engineered MEANS BETTER COLD ROLL FORMING

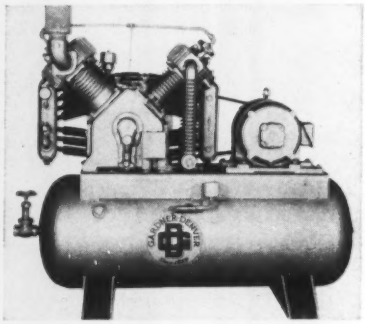
American ROLLER DIE CORP.

29520 Clayton Avenue — Wickliffe, Ohio

DESIGNERS AND MANUFACTURERS All Sizes and Spindle Diameters of Roll Forming Machines, Welded and Lock-Seam Tube Mills • Forming Rolls, Tubing and Pipe Rolls • Straightening, Pinch and Leveller Rolls • Cut-off Machines

Air Compressor

In continuous service, this small compressor has a piston displacement of 100 cu ft a minute at 870 rpm.



The discharge pressure is a maximum of 250 psi in intermittent service. *Write*: Gardner-Denver Co., Quincy, Ill. *Phone*: 551

Rotary Pipe Cutter

The surface finish of the cut made by this machine is suitable for gasket face use.

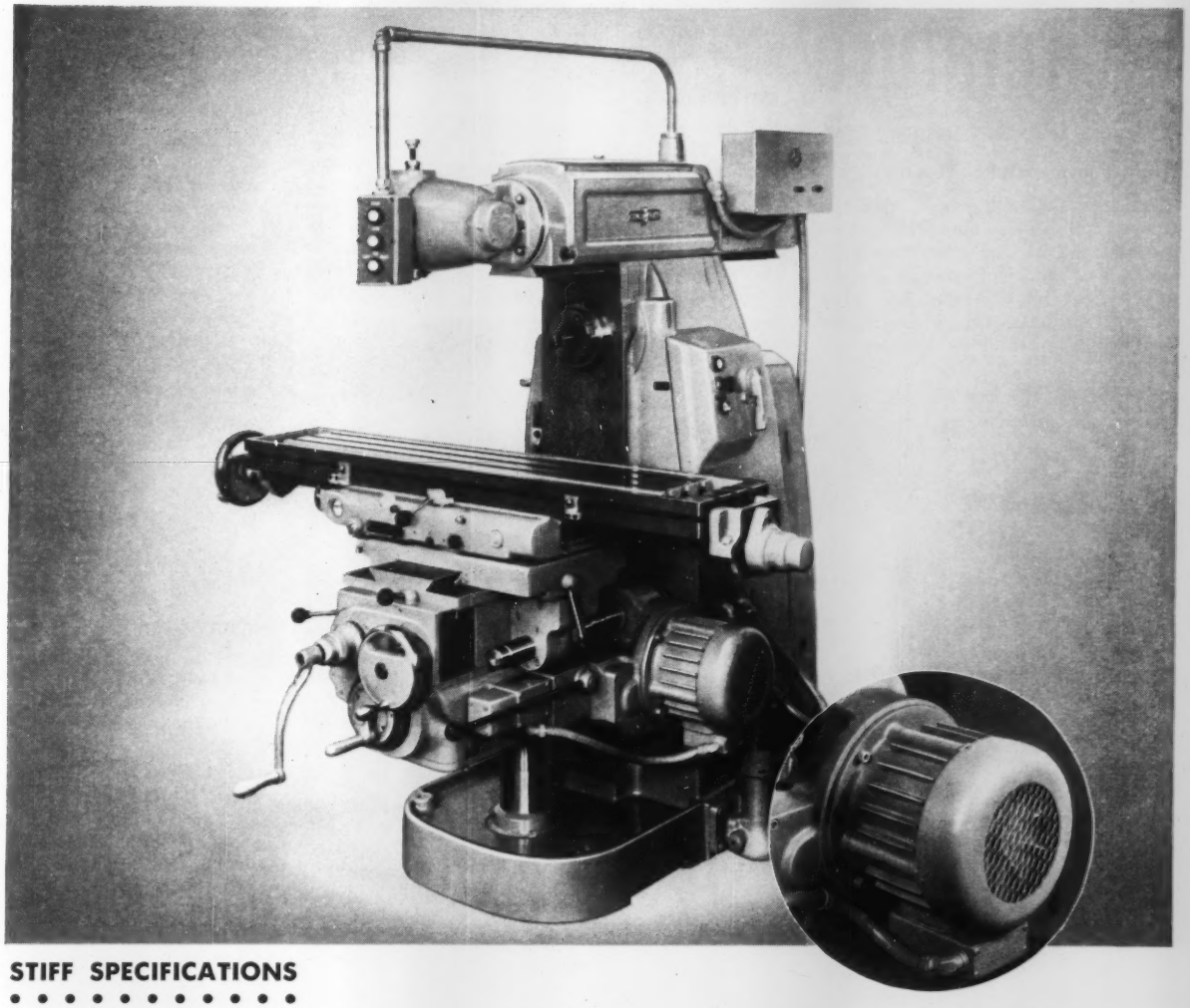
It handles a 40 ft pipe with a wall thickness of ⅞-in. or heavier provided the first cut is 5 ft or more.

Movement of the chucking device back and forth is electrical. *Write*: Wallace Supplies Mfg. Co., 1304 Diversey Parkway, Chicago 14, Ill. *Phone*: Buckingham 1-7000

Protective Paper

A paper to guard highly finished surfaces against marring in fabrication, shipment or storage can be removed easily after long periods without strain or adhesive deposit.

Tensile strength is 27 lb per inch of width in the machine direction and 9 lb in cross direction. The paper is normally wound in 100-yd rolls. *Write*: Behr-Manning Co., Troy, N.Y. *Phone*: Arsenal 3-0100



STIFF SPECIFICATIONS

Yet a DIEHL motor met all requirements

The requirements of one of the largest milling machine manufacturers called for a close-coupled, special duty motor to raise and lower the knee and develop sufficient torque for heavy table loads in rapid traverse without stalling. Cool operation was imperative to avoid distortion of the machine table due to heat transfer. The motor was to be mounted directly on the gear case, therefore complete protection against oil leakage into the motor was essential. Motor size, compactness and appearance were important factors. DIEHL developed the special totally enclosed motor illustrated, which met all desired requirements. Cool operation was assured by the fan-cooled design of the motor, effectively preventing heat transfer. The flat-type construction saved considerable space and overhang, conforming well with machine contours. Positive and dependable machine operation was the end result.

This is another example of DIEHL accomplishment based on almost three-quarters of a century of experience in the design and manufacture of motors for industry. Utilize this experience in the solution of your motor problems. We'll work closely with you to provide the right motor — at the right time — at the right price.

DIEHL MANUFACTURING COMPANY
Electrical Division of
THE SINGER MANUFACTURING COMPANY
Finderne Plant, SOMERVILLE, N. J.

Diehl

☐ Please send me Consolidated Motor Catalog and Price List No. S-7 —3540

☐ Please have a DIEHL representative call

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NEW literature

Write directly to the company for a copy

High Temperature Tubing

Bulletin 145A, 4 pages, discusses tubing and piping made of a steel containing 2.25 per cent chromium and 1 per cent molybdenum for use at elevated temperatures and pressures. Bulletin 152, 4 pages, describes pipes containing 1.25 per cent chromium and 0.5 molybdenum. Tubular Products Division, Babcock & Wilcox Co., Beaver Falls, Pa.

Strapping

Round steel strapping in sizes from 14 to 18 gage are described in this bulletin. Gerrard Steel Strapping Division, United States Steel Corp., 2915 W. 47th St., Chicago 32, Ill.

Castings

This 8-page bulletin describes the contents of 15 publications dealing with the selection, purchasing, design and fabrication of gray iron castings. Gray Iron Founders' Society Inc., National City—East Sixth Bldg., Cleveland 14, O.

Plastic Sealant

This 12-page bulletin discusses selection of the proper grade of liquid sealant to use for locking threaded fasteners. American Sealants Co., 103 Woodbine St., Hartford 6, Conn.

Welding Positioners

This 4-page bulletin, FT 57, describes floor turntable welding positioners (capacities from 1000 to 120,000 lb). Aronson Machine Co., Arcade, N.Y.

Motive Power Batteries

A revised reference catalog discusses important new features of batteries used in electric industrial trucks and mine vehicles—form 5161, 12 pages. Exide Industrial Division, Electric Storage Battery Co., Box 8109, Philadelphia 1, Pa.

Milling Cutters

A description of milling cutters is given in this 8-page bulletin. The cutters use carbide inserts. Newcomer Products Inc., Latrobe, Pa.

Static Switching

A description of the eight basic units of static switching is given in this 8-page bulletin, GEA-6364A. A typical application is presented. General Electric Co., Schenectady 5, N. Y.

Gear Shaving

A diagonal gear shaving machine and the process are described in this 4-page bulletin. National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, Mich.

Quick-Release Pins

Single-acting, self-locking pins for aircraft uses are described in bulletin ADI 1268-257, 6 pages. Aviation Developments Inc., P.O. Box 391, Burbank, Calif.

Conveyor Planning

This 8-page folder gives information on overhead conveyor systems. Chainveyor Corp., 5618 E. Washington Blvd., Los Angeles 22, Calif.

Gage Laboratories

This 20-page bulletin gives manufacturers information for setting up gage laboratories. Department 700, Sheffield Corp., Dayton 1, O.

Heat Treating

Electric and gas fired models of heat treating equipment are described in a 12-page bulletin. In-

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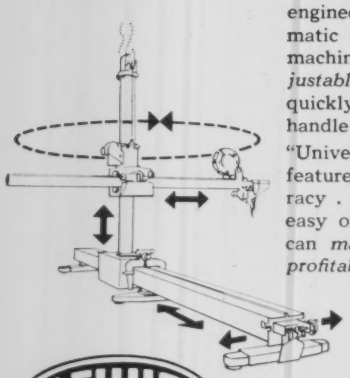

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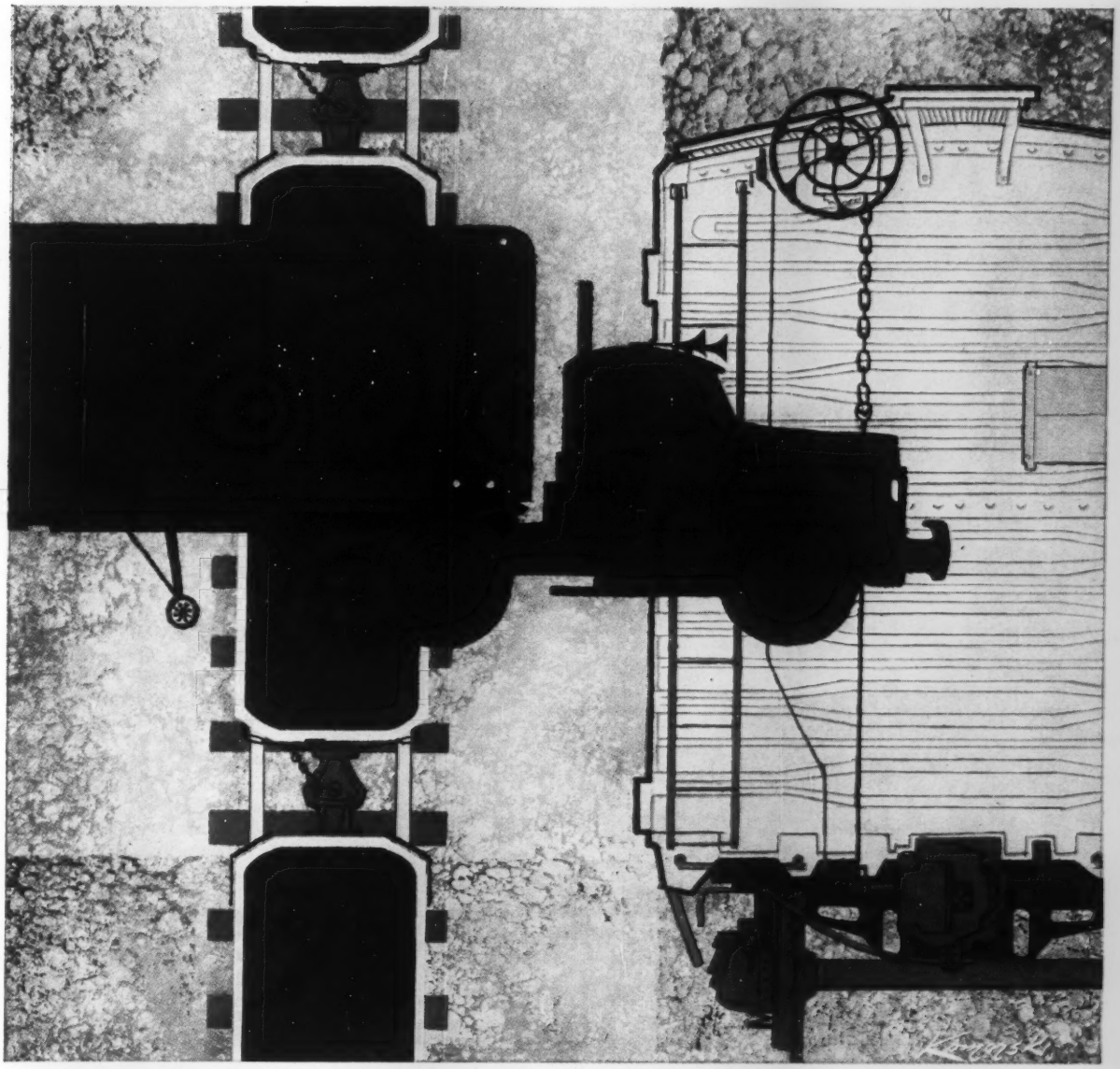

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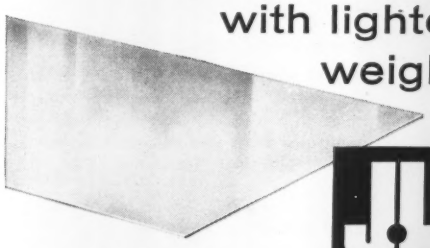

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cluded are vacuum furnaces, rotary and shaker hearth furnaces, automatic conveyors and brazing units. Pacific Scientific Co., P.O. Box 22019, Los Angeles 22, Calif.

Thread Tools, Boring Unit

A 22-page catalog (form 5701) describes tangent and radial threading dies, collapsible and adjustable taps. Form 5705, 6 pages, describes a precision boring machine for turning, boring and facing. Advertising Department, Jones & Lamson Machine Co., Springfield, Vt.

Spray Lubrication

The development and application of spray lubrication is discussed in this technical paper. Farval Corp., 3270 E. 80th St., Cleveland 4, O.

Pressure Gages

Gages that are suitable for installation where they will be subjected to violent pressure pulsations or mechanical vibrations are described in this 32-page catalog, G-52. Helicoid Gage Division, American Chain & Cable Co., Bridgeport 2, Conn.

Continuous Casting

Machines for the production of heavy and light nonferrous metals are explained in this 4-page bulletin on continuous casting. Lobeck Casting Processes Inc., 114 E. 32nd St., New York 16, N.Y.

Indexing Machine Components

An 8-page data sheet set illustrates self-contained components that are engineered for quick assembly into high production automatic machines. Hartford Special Machinery Co., Hartford, Conn.

Radial Drill Presses

An improved line of machines permits you to move the spindle head to the work, eliminating special jigs and fixtures. Walker-Turner Division, Rockwell Mfg. Co., 400 N. Lexington Ave., Pittsburgh 8, Pa.

Drop Forging Hammer

The piston-lift gravity drop hammer features complete control of stroke variation—bulletin 361, 6 pages. Erie Foundry Co., Erie, Pa.

Fume Control

An 8-page bulletin tells how to control the fumes from electric furnaces. Wheelabrator Corp., 1157 S. Byrkit St., Mishawaka, Ind.

Brushes

Wire brushes are described in this 22-page catalog, color-coded to simplify selection. Anderson Corp., Worcester, Mass.

Scrap Presses

Specifications and descriptions of scrap presses are given in this 4-page bulletin, 215. Logemann Brothers Co., Milwaukee, Wis.

Eliminating Cracking

Means of eliminating cracking hazards in the manufacture of tools and dies are described in this 8-page bulletin. Carpenter Steel Co., 339 W. Bern St., Reading, Pa.

Propeller Fans

New fan sizes are listed in this 32-page catalog, A-109C. It includes information on air deliveries, performance data and dimensional drawings. Hartzell Propeller Fan Co., Piqua, O.

Self-Locking Bolts

Bolts for fastening problems involving adjustment, liquid sealing and vibration are described in this

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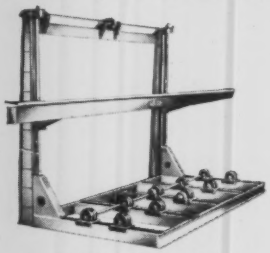

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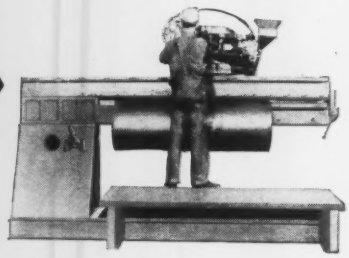

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For Illustrated Literature—Write Department D

REED EQUIPMENT DIVISION
THE WEBB CORP. WEBB CITY, MO. U. S. A.

4-page bulletin, ADV-792. Advertising Division, Republic Steel Corp., 3100 E. 45th St., Cleveland 27, O.

Corrosion Protection

Selection of the best corrosion proofing methods and products is discussed in this 8-page bulletin. Corrosion Engineering Dept., Pennsalt Chemicals Corp., 3 Penn Center, Philadelphia 2, Pa.

Welding Wire

This bulletin, AW 100, describes automatic welding wire for submerged arc and inert gas welding. Reid-Avery Co. Inc., Dundalk, Baltimore 22, Md.

Expanders

This 10-page bulletin contains a complete sectional drawing of a hydraulic expander. Grotnes Machine Works Inc., 5454 N. Wolcott Ave., Chicago 40, Ill.

Threading Machines

Bulletin D 86, 10 pages, contains data on the construction, operation and specifications of pipe and nipple threading machines. Landis Machine Co., Waynesboro, Pa.

Dust and Fume Eliminators

A rotor type dust and fume eliminator is discussed in this 8-page bulletin, VRU 4-57. Schmieg Industries Inc., P.O. Box 4701, Detroit 34, Mich.

Locknuts

Two 4-page bulletins describe spin locknuts and pilot type and recessed type weld nuts. They include information on sizes, dimensions and specifications. MacLean-Fogg Lock Nut Co., 5535 N. Wolcott Ave., Chicago 40, Ill.

Deep Hole Drilling

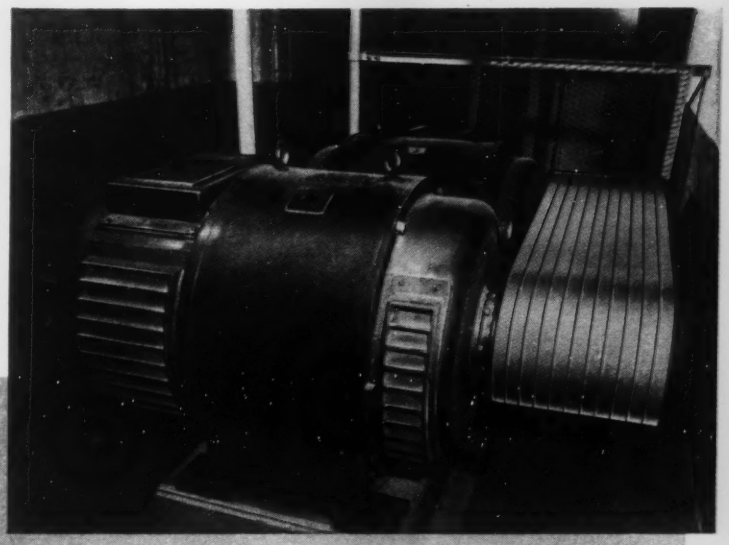
A machine for drilling deep holes with 0.001 to 0.0015 in. drift tolerance is described in this 4-page bulletin. The machine bed is 50 ft square. Lahr Machine & Tool Corp., 3400 Maplewood Ave., Toledo 10, O.

Leaded Steel

Properties of a leaded alloy steel are described in this 4-page bulletin. Horace T. Potts Co., Erie avenue and D street, Philadelphia 34, Pa.

Control Centers

The planning of control centers and their specifications are covered in this 16-page bulletin. Square D Co., 4041 N. Richards St., Milwaukee 12, Wis.



How CONCAVE SIDES cut V-belt costs

By this simple test you can see for yourself how the concave sides (Fig. 1) of the Gates V-Belt lengthen the life of the belt... *thus reducing costs.*

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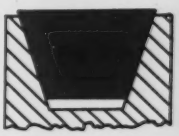
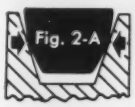


Now make the same test with a straight-sided belt. (Fig. 2) Notice how the sides bulge out on the bend (Fig. 2-A) concentrating the wear at the points shown at arrows.



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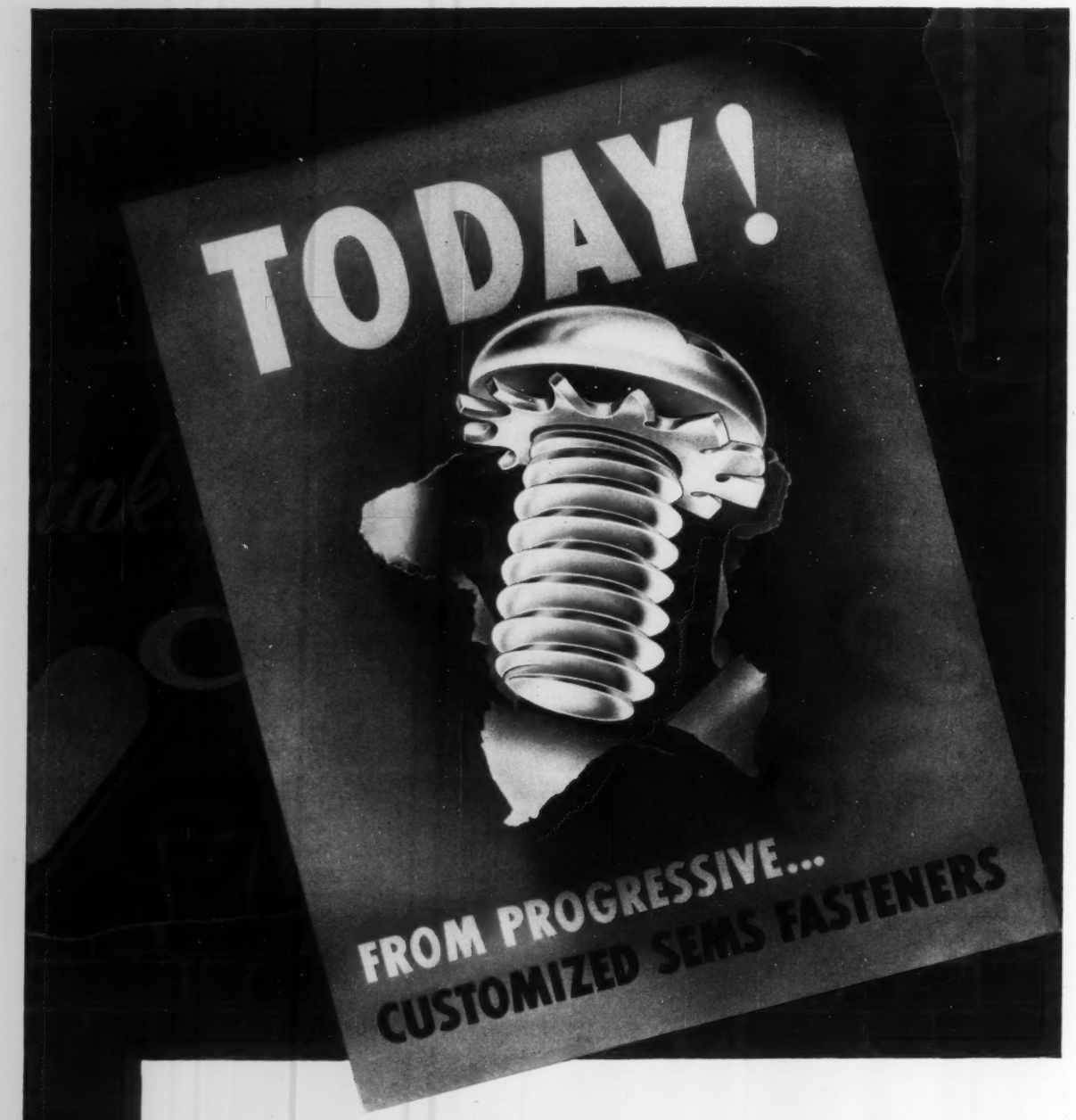

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Market Outlook

ANOTHER steel product is easier to get. It's structural shapes—one of the last forms to approach a supply-demand balance.

Evidence of the easing is a $7 a ton price cut made by a premium price producer—a reduction made on the heels of a $5.50 a ton raise by the producers quoting standard prices. The move was made by the Barium Steel Corp. subsidiary, Phoenix Iron & Steel Co., Phoenixville, Pa., and applies to standard structurals and wide flange beams.

NARROWING THE SPREAD—The Phoenix base price on structurals now is $110 a net ton —$3.50 above other eastern producers. The spread had been $16.

It's customary for Phoenix to charge above the general market when demand is strong and below it when demand is slow. The fact that Phoenix still levies a small premium indicates that there is not an oversupply of structurals.

CUTTING THE PRESSURE — Contributing to the easing in structurals are a reduction in new orders and an increase in capacity. A measure of the lowered demand is the bookings for fabricated structural steel; in the first five months of this year they declined a total of 18 per cent from the corresponding period of last year. Capacity to produce structural shapes rose 2,063,130 tons, or 37 per cent, in the three years prior to Jan. 1.

HOLDING TIGHT— Phoenix did not reduce its premium price on plates. This confirms that the strong demand for them—particularly the thick sizes—continues. But, Phoenix did not raise its plate price. It holds at $116 a ton. Other producers upped their plate price $5 a ton. This reduces the spread between Phoenix and other eastern producers to $12 a ton. The differential had been $17.

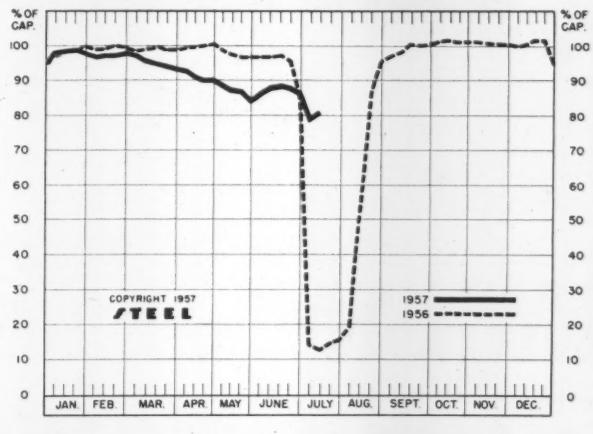
PIG IRON RAISED—The steel industry continued to revise prices upward in line with the pattern set by U.S. Steel Corp. While the pattern did not include a price hike for pig iron, several southern producers upped their pig iron prices $3.50 a gross ton. They did not raise their prices last March when northern producers bumped up theirs $2 a ton. Since March, the differential between southern and northern prices of pig iron had been $6 a ton.

MIXED PRICE TRENDS—Not all prices are going up. Those on refractories—an important material for the iron and steel industry—are holding steady (see page 159). Steel consumers' action in response to increased steel prices is mixed. Some of them will pass on all of the increase; some will absorb part of it; and others will absorb all of it (see page 53).

PRODUCTION RISES—Steel production recovered slightly from the July 4th holiday low and registered 80.5 per cent of capacity in the week ended July 14. The rate for the preceding week (which included the holiday) had been 78.5 per cent. A rare occurrence in the holiday week was the shutdown of all steelmaking furnaces in the New England district, giving it an operating rate of zero. In the week ended July 14, 20 per cent of the district's steel furnace capacity had returned to operation.

Holding down operations in the steel industry are vacations and lowered demand for steel.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

(Percentage of Capacity Engaged)

	Week Ended July 14	Change	Same Week 1956	Same Week 1955
Pittsburgh	89	+ 4*	2.5	92.5
Chicago	86.5	+ 0.5*	6	95.5
Mid-Atlantic	93	+ 4	9	95
Youngstown	73	+ 4.5	5	98
Wheeling	80	+ 8	56	94.5
Cleveland	80	— 0.5*	0	100.5
Buffalo	88	+ 2.5	0	105
Birmingham	92.5	0	3.5	93.5
New England	20	+20*	8	80
Cincinnati	74	— 3.5*	66	87
St. Louis	80.5	0	95.5	92
Detroit	87.5	— 8.5*	15.5	88
Western	101	+ 1	30	100
National Rate	80.5	+ 2	12.5	93

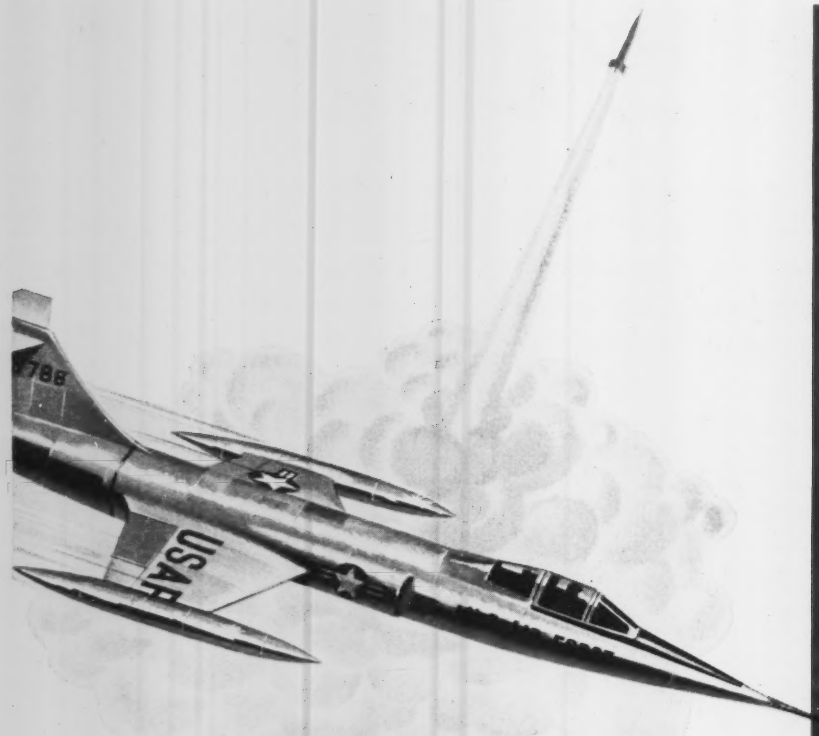
INGOT PRODUCTION‡

	Week Ended July 14	Week Ago	Month Ago	Year Ago
INDEX (1947-1949=100)	128.1†	125.1	137.8	119.7
NET TONS (In thousands)	2,057†	2,009	2,214	317

*Change from preceding week's revised rate. †Estimated. ‡Amer. Iron & Steel Institute. Weekly capacity (net tons): 2,559,490 in 1957; 2,461,893 in 1956; 2,413,278 in 1955.

Metalworking Outlook—p. 47

Technical Outlook—p. 103



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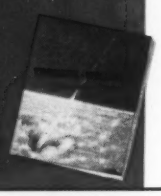
T & W Technique

Creep test equipment, one of the facilities which permit T & W to make the laboratory and production tests, such as stress rupture tests, ultrasonic inspection, required for aircraft parts.



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Harbison-Walker Refractories Co.

Refractory inventories are high, but producers believe they will be reduced soon. They are set for an active second half and another good year

Refractory Prices Stable

Producers boosted them last April and see no across-the-board hikes in the near future. They look for 1957 business to at least equal 1956 in volume

AMID the upsurge in prices following the steel industry's adjustment (see page 53), the current price stability in the refractory industry is almost like finding a cool breeze on a hot day. Almost without exception, the industry is going to stand pat despite the fact that, historically, it follows the lead of the steel industry.

There's only one hitch: Refractory prices were hiked last April to take into account increased freight rates, cost of living adjustments for workers and anticipated higher costs as the result of wage boosts on July 1.

Exception—One midwest producer says there are bound to be some adjustments, but he thinks they will be minor. The most significant change probably will be for dead burned dolomite, which was not affected by the April increase. One major producer has announced an increase of about 4.5 per cent effective Aug. 1. Another industry official believes the other producers will follow suit. However, it will not represent a significant increase in costs for the steel companies. "Dead burned dolomite is important in steelmaking," he says, "but its volume by comparison with other refractory materials is almost peanuts."

At the moment, sales in the refractory industry are suffering from that April increase. Customers bought heavily in the first quarter to protect their costs, and now they are eating up inventories and counting on speedy delivery to replenish stocks later. Industry officials are not worried about it, though. This is normally their slack season, and they expect a pickup in third quarter. "I don't think it will have the aspects of a boom," says one sales vice president, "but it will be enough to help us keep 1957 even with 1956."

Minus Side—Generally, this is not as good a year as most refractory producers counted on. Being so closely allied with the steel industry (iron and steel producers consume over half of all refractories), the reduction in steelmaking since the second quarter is having a direct effect on sales. So is the reduction in foundry operations. While the nonferrous industry is a small customer compared with steelmaking, current price reductions in copper, lead and zinc are dampening sales. The strike which is tying up a large part of the cement industry also is reducing the demand for fire brick.

Plus Side—The expansion program in the steel industry, requiring huge quantities of bricks, nozzles, sleeves, runners and other refractory materials, is helping to maintain good business. Maintenance, which accounts for a large majority of the steel industry's requirements, is on the upswing. Many steelmen are relining and repairing overworked furnaces during the current easing in operations. The glass industry is still a good customer, although foreign competition is forcing some cutbacks in the East. The aluminum industry, with its continuing expansion program and fairly high rate of operations, is one of the most active nonferrous outlets for refractory products.

The net effect is a downward revision in earlier estimates for business in 1957. One sales executive remarks that late in 1956, his company anticipated operations at 100 per cent, 95 per cent, 85 per cent and 90 per cent of capacity by quarters in 1957. "We're running a couple of points below that, but it is still as good as we did last year," he says. Another midwest producer, who isn't as dependent on the steel industry as some of his colleagues, reports that his production will be 2 to 5 per cent better this year than last. "Dollar volume will be a great deal better," he adds.

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Tin Plate . . .

Tin Plate Prices, Page 171

Continental Can Co., New York, will build a $3.5 million can manufacturing plant at Merced, Calif. It will be on a 25-acre site, according to H. M. Blinn, vice president of the company's Pacific Metals Division.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 170 & 171

Shipments of hot and cold-rolled sheets will be heavier in August than in July. Demand still leaves much to be desired With the mills still offering early deliveries, consumers are slow to build up inventories. This applies not only to the tonnage items (hot and cold-rolled) but to specialties as well.

In the Midwest, one mill says its cold-rolled sheet volume is better this month than had been expected. In the case of hot-rolled sheets, though, its experience is just the reverse. The answer isn't clear but it could reflect an effort by consumers to bolster or balance their inventories.

Conceivably, this move was started in June on hot-rolled sheets to beat the price advance but laying in of cold-rolled too far in advance of use isn't good practice if deep-drawing operations are to be performed. This would explain the delay up to now in cold-rolled buying.

Except for a slight improvement in buying of coated sheets (zinc and aluminum) for July-August shipment, buying of flat-rolled products continues dull in New England. Indications are consumers will take normal tonnage next month and increase their specifications for September tonnage.

Specifications are on the upgrade in the eastern markets but there is little interest in shipments beyond August. Sufficient specifications have come through for that month to assure more activity than in July.

Steel for rebuilding towns in southern Louisiana flattened by hurricane Audrey was being processed by Tennessee Coal & Iron Division, U.S. Steel Corp., Birmingham, almost before the storm had fully subsided. More than 500

tons of galvanized roofing and siding were shipped to the disaster area within a few days.

Cities and towns to which sheets were shipped included: Church Point, Opelousas, New Iberia, Lake Charles, Eunice and New Orleans.

Because of the priority given disaster victims, deliveries to regular customers were slightly delayed.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 169

Demand continues strong for reinforcing steel bars since this is the peak of the building season. Fabricators are pressed to engineer and bid on work several months ahead. Requirements on public account, such as schools and road construction, are particularly heavy.

So far the strike in the cement industry has not affected consumption of reinforcing steel. It will soon if a settlement isn't effected.

Steel Bars . . .

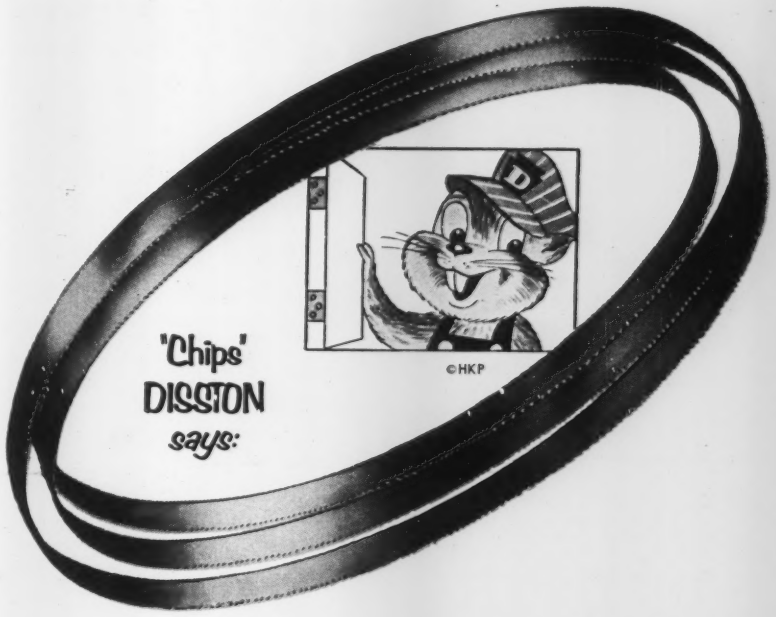
Bar Prices, Page 169

Improved bar mill operations are indicated for August and September. Sales have reached a low point for the year to date, but at some market centers a slight quickening of forward interest by consumers is noted, especially for August and September. Expectations are that September's production schedules will show a greater percentage improvement over August's than August's did over July's.

The mills are optimistic about fourth quarter volume. Some think business will exceed second quarter's volume. Excess consumer inventories are thought certain to be worked off by the end of the current quarter; this situation, combined with anticipated heavier consumption by the automotive and related industries and a possible upturn in machine tool requirements, should materially boost over-all demand for bar stock.

Producers are filling most orders in one to three weeks. Prompt delivery demand has dropped off since prices went up at the opening of the month.

Some bar mills closed for mass vacations. At Pittsburgh, for example, three producers of cold-



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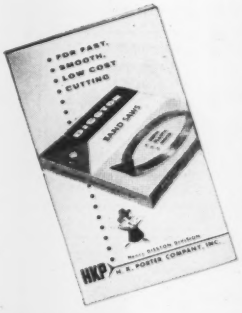
Does your work call for close tolerance cutting . . . fine edge-holding qualities . . . good finish? Disston Metal Cutting Band Saws give you all that and more —*long, long blade life!*

LANCER TOOTH—Hard edge blade with positive rake angle tooth. Permits high-speed production cutting of non-ferrous metal, wood and plastic. Cuts brass and aluminum solids and Plexiglas with equal ease.

REGULAR TOOTH—Hard edge flexible back band saw with finer tooth spacing. Cuts all ferrous metals and thinner sections of non-ferrous metal and plastic. Excellent for sawing angle iron, steel tubing, nickel plate and brass sheets.



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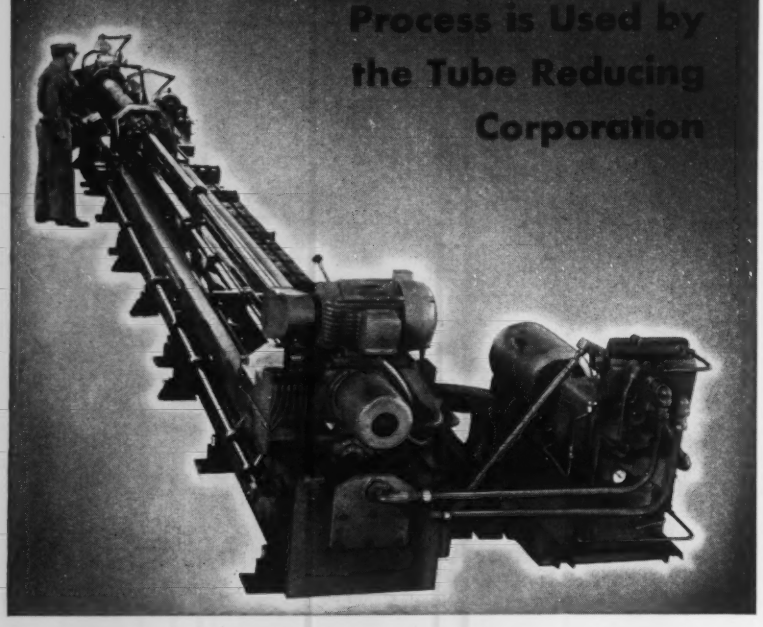
HKP Henry DISSTON DIVISION
H. K. PORTER COMPANY, INC.

Why MICROHONING

Process is Used by the Tube Reducing Corporation



The carbon steel, stainless steel, alloy steel and non-ferrous tubes manufactured by the Tube Reducing Corporation are used on applications that require high strength, uniform wall thickness and surfaces free of pits, scratches or other imperfections.

In processing its tubes, Tube Reducing uses Microhoning, either to prepare the tubing for its exclusive "Rockrite" process, or to generate functional characteristics in finished tubing.

As a preparatory operation—which produces a round, straight bore and a clean-cut, cross-hatch surface pattern—Microhoning helps to improve the results of "Rockriting." The Microhoned surface slides easily over the "rocking" mandrel and compresses to a smooth, flaw-free surface that passes the most rigid inspection and tests.

Other "Rockrite" tubes, used in such applications as hydraulic cylinders, are Microhoned after "rocking" to generate final bore size and geometric accuracy.

The principles and application of Microhoning are explained in a 30-minute, 16mm, sound movie, "Progress in Precision"... available at your request.

☐ Please send me "Progress in Precision" in time for showing on _____ (date).
☐ Please have a Micromatic Field Engineer call.
☐ Please send Microhoning literature and case histories.

NAME _____ F
TITLE _____
COMPANY _____
STREET _____
CITY _____ ZONE _____ STATE _____

MICROMATIC HONE CORP.
8100 SCHOOLCRAFT AVENUE · DETROIT 38, MICHIGAN

finished were closed down last week, and two others are closed this week. Generally, the larger mills are staggering vacations, permitting them to maintain operations without too much difficulty.

Tubular Goods . . .

Tubular Goods Prices, Page 173

Pacific Gas & Electric Co., San Francisco, has awarded a contract to Engineers Limited Pipeline Co. for installation of 138 miles of 24-in. transmission line. Upon completion, it will transit 950 million cubic feet of natural gas daily. The line is known as "Super Inch."

Specialty tubing sales continue to decline. Some public utility companies are postponing orders for pressure tubing. But few order cancellations are reported. Demand for mechanical tubing is slow.

Buttweld pipe sales are beginning to climb after the vacation lull early this month. Sales should pick up noticeably in most tubular categories during August.

Plates . . .

Plate Prices, Page 169

Sheared plate supply continues tight. This is reflected in unchanged premium prices quoted by an eastern mill (Phoenix Iron & Steel Co., Harrisburg, Pa.) in the face of its reduction of about $7 a ton on standard and wide flange structurals produced at its Phoenixville, Pa., works.

The company's premium on plates, of course, has been narrowed $7 a ton by the increase in prices effected by other producers. Its premium on shapes has been narrowed to $3.50 a ton by the combined action of its own price reduction of $7 a ton and the advance of $5.50 a ton effected in the general market.

Gradual but steady increase in demand for quality and alloy grade plates in New England indicates larger volume business at higher prices. Two eastern makers have advanced prices on clad plate.

One eastern platemaker is having difficulty with one of its mills and is falling behind on its delivery promises. It will have a substantial carryover going into September. The Claymont, Del., pro-

ducer has closed down its 160-in. mill for repairs. It will be down the greater part of this month.

Strip plate is in comfortable supply. Demand for this class of material is declining, including railroad requirements. Some consumers built up stocks during June.

Tool Steel . . .

Tool Steel Prices, Page 173

The highly competitive tool steel industry will be slow to raise prices, most producers say. They point out that demand from consuming lines is sluggish, including the automotive and related industries. Defense requirements are reported substantial.

Wire . . .

Wire Prices, Pages 171 & 172

Wire mill operations are sluggish, reflecting vacation suspensions and other seasonal factors. Buying is slow, and mill backlogs are described as relatively thin.

Shipments are obtainable within 30 days in many cases. Consumer inventories are down to a point where a substantial pickup in orders is expected in September.

Structural Shapes . . .

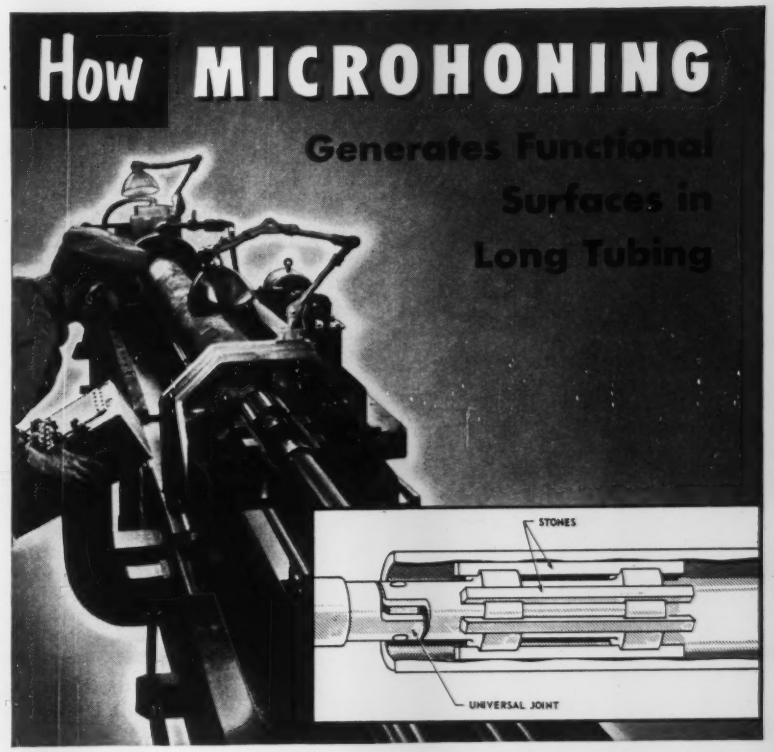
Structural Shape Prices, Page 169

Structural steel supply is easier than it was. This is particularly true of standard shapes, but it also applies to a lesser extent to wide flange sections.

The improvement in availability is reflected in a somewhat easier price situation. One premium price mill, Phoenix Iron & Steel Co., Phoenixville, Pa., has reduced its base prices on standard and wide flange structurals $7 a ton in the face of an increase by other makers. Despite the reduction, this mill still quotes $3.50 above the general market level.

Competition among fabricators remains sharp, but the advance of $5.50 per ton effected at the opening of the month by the leading steel mills has stiffened the fabricated material market. Yet, some structural shops are not fully reflecting the higher steel prices in their estimates on new work.

Aside from bridge work, new awards are spotty. Inquiry also is slower, both commercial and in-



Microhoning is used by the Tube Reducing Corporation in processing many types of tubing that range up to 18 feet long and 9½ inches in diameter. The tubes are Microhoned on a horizontal Hydrohoner equipped with a hydraulic clamping fixture that is easily adjusted to handle tubes of various sizes.

Microhoning tools have long abrasive sticks which cannot follow irregularities in the bore. The abrasive action removes high spots while generating required surface characteristics and accurate geometry. A universal joint, connecting the tool body to the drive shaft, eliminates any tendency of abrasive action to change the bore location.

Typical processing of "Rockrite" tubes: To remove scale and deep scratches . . . hot rolled, pierced billets are first bored. Then, the bores are Microhoned—stock removal rate is .015 inch from a 4½-inch diameter x 128-inch length in less than 30 minutes. The Microhoning operation generates accurate, round, straight surfaces with the required finishes of 20 to 30 microinches r. m. s.

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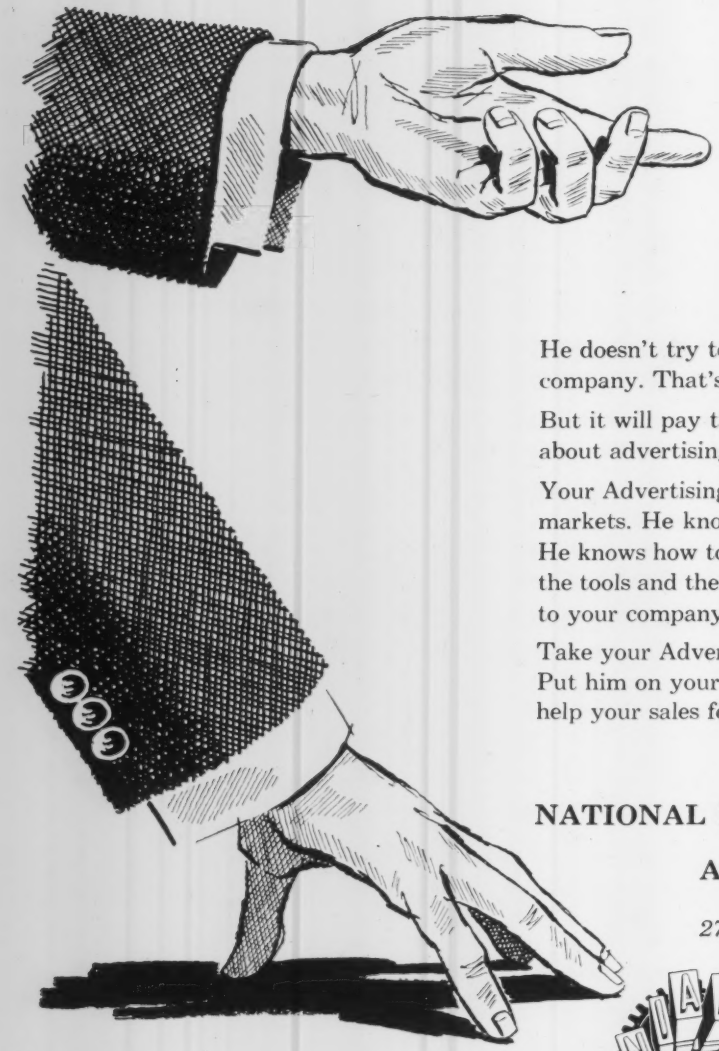
Does your Board of Directors listen to this man?



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An organization of over 4000 members engaged in the advertising and marketing of industrial products, with local chapters in ALBANY, BALTIMORE, BOSTON, BUFFALO, CHICAGO, CLEVELAND, COLUMBUS, DALLAS-FORT WORTH, DENVER, DETROIT, HAMILTON, ONT., HARTFORD, HOUSTON, INDIANAPOLIS, LOS ANGELES, MILWAUKEE, MINNEAPOLIS-ST. PAUL, MONTREAL, QUE., NEWARK, NEW YORK, PHILADELPHIA, PITTSBURGH, PORTLAND, ROCHESTER, ROCKFORD, ST. LOUIS, SAN FRANCISCO, TORONTO, ONT., YOUNGSTOWN.

dustrial work being off, with bridge demand less pressing. Despite the lag, fabricating shops are still busy, and practically all shops are reported to be holding comfortable order backlogs.

Recently, building operations in the New York area have been somewhat retarded by strikes in certain of the building trades, although the steel erectors have a contract that runs for another year. Strikes at cement mills are having a bearing on construction generally.

Pig Iron . . .

Pig Iron Prices, Page 174

Producers of southern pig iron raised their prices $3.50 a ton last week. This action was attributed to increased labor and other costs. The southern producers last raised their prices in July a year ago. (They did not go along with the northern furnaces in advancing prices $2 a ton last spring.)

Whether the southern move forecasts an upward revision in the north is uncertain. Up to late last week, northern producers had taken no action, but some market observers would not be surprised if northern prices were upped $1.50 a ton.

Foundry closings for vacations are numerous and July will be the year's lightest month in shipments of merchant pig iron and coke. Shipments probably will continue light until after Labor Day. The trend from then on through November should be upward, with a leveling off coming early in December. Current buying is hand-to-mouth though consumers' stocks generally are light.

Foundry operations in the East are reported at least 25 to 30 per cent below normal, based on a five-day week operation, single turn.

Iron production is declining at present. Jones & Laughlin Steel Corp. blew out its No. 2 stack at Pittsburgh for complete rebuilding. It will be enlarged from 800 to 1300 tons daily. U.S. Steel Corp. blew out its No. 4 blast furnace at its Ohio Works July 5 for relining. It will be down about three months.

Currently, only 37 of the Chicago district's 43 blast furnaces are operating. Taken out for relining and repairs are No. 2 stack of U.S. Steel at Gary, Ind., and No. 2 of Inland Steel at Indiana Harbor, Ind.

Blast furnace operations have been maintained at a fairly high level in recent months as the steelmakers sought to offset high scrap prices by using larger percentages of hot metal in their open-hearth charges.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

5000 tons, 500 car frames, Southern Pacific railroad, to Gunderson Bros. Engineering Co., Portland, Oreg.

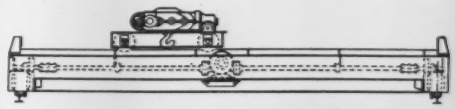
3900 tons, state bridge work over Schuylkill river, Philadelphia, through McCloskey & Co., Philadelphia, to the Bethlehem Steel Co., Bethlehem, Pa.

1275 tons, highway structures, Southeast expressway, Braintree-Quincy, Mass., to West End Iron Works, Cambridge, Mass.; Marinucci Bros. Co. Inc., Boston, general contractor.

700 tons, Santiam river bridge, Oregon state, to Isaacson Iron Works, Seattle; D. M. Drake & Co., Portland, Oreg., general contractor.

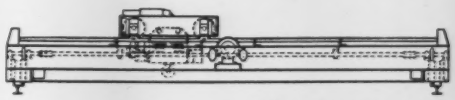
550 tons, Cardinal Spellman High School, Brockton, Mass., to Groisser & Shlager Iron

STANDARD HEADROOM
Provides highest hook height with top-running trolley and foot mounted hoisting unit.



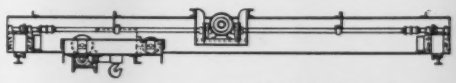
Model DTMD—TT

MEDIUM HEADROOM
Here the hoisting unit is rigidly suspended from the top-running trolley to reduce clearance over rail.



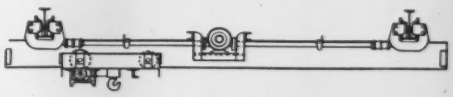
Model DTMD—LT

LOW HEADROOM
Under-running trolley permits unusually high hook lift. Use it where clearance under bridge must be maximum.



Model DTMD—UT

SUSPENDED TRACK
Operates on lower flange of crane runway suspended from roof guiders or other overhead support. Use also where load transfer is desired.



Model DUMD—UT

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Works, Somerville, Mass. (structurals), and Bethlehem Steel Co., Bethlehem, Pa. (reinforcing bars); John A. Volpe Construction Co., Malden, Mass., general contractor.

450 tons, high school, Meriden, Conn., to City Iron Works Inc., Hartford, Conn., (structurals), and Fox Steel Co., Orange, Conn. (reinforcing bars); New England General Contracting Co., New Haven, Conn., general contractor.

415 tons, state highway bridges, Bangor, Me., to Bancroft & Martin Rolling Mills Co., South Portland, Me., through Cianchette Bros., Pittsfield, Me., general contractor.

375 tons, two state bridges, Guilford-Vernon, Vt., to Vermont Structural Steel Co., Burlington, Vt.; W. H. Hinman Inc., North Anson, Me., general contractor; 50 tons, reinforcing bars, Joseph T. Ryerson & Son Inc., Boston.

350 tons, state highway bridges, Colchester-Marlborough, Conn., to Bethlehem Steel Co., Bethlehem, Pa.; S. & M. Construction Co., Providence, R. I., general contractor.

225 tons, bridge, Swift power project, Washington state, for Pacific Power & Light Co., to Poole, McGonigle & Dick, Portland, Oreg.

212 tons, Dirks building, Portland, Oreg., to Poole, McGonigle & Dick, Portland; Reimers & Jolivette, Portland, general contractor.

210 tons, East Junior High School, Brockton, Mass., to West End Iron Works, Cambridge, Mass.; White Construction Co., Boston, general contractor; 130 tons, bar joists, and 40 tons, reinforcing bars, Northern Steel Inc., Medford, Mass.

150 tons, senior high school, Cheltenham, Pa., to Bethlehem Fabricators, Bethlehem, Pa.

100 tons, laboratory No. 2, Sylvania Electric Products Inc., Waltham, Mass., to American Bridge Division, U.S. Steel Corp., Pittsburgh; Aberthaw Construction Co., Boston, general contractor; 50 tons, reinforcing bars, Concrete Steel Co., Boston.

STRUCTURAL STEEL PENDING

1219 tons, state bridge work, route 108, section 2-B, Camden county, New Jersey, bids July 23; 483 tons of reinforcing steel also required.

585 tons, including 405 tons of alloy, girder bridge, East Cap street, Anacostia freeway, Washington, bids July 17; also 200 tons, reinforcing bars.

250 tons, state highway bridge, Oregon state; bids in.

140 tons, Washington state, two highway jobs, Grant county; bids to Olympia, Wash., July 16.

REINFORCING BARS . . .

REINFORCING BARS PLACED

910 tons, state highway structures, Southeast expressway, Quincy-Braintree, Mass., to Northern Steel Inc., Medford, Mass.; Marinucci Bros. Co. Inc., Boston, general contractor.

450 tons, six state highway structures, Norwich, Conn., to Truscon Steel Division, Republic Steel Corp., Boston; Brunelli Construction Co., Southington, Conn., general contractor.

315 tons, addition, Noble Hospital, Westfield, Mass., to Truscon Steel Division, Republic Steel Corp., Boston; Daniel O'Connell's Sons Inc., Holyoke, Mass., general contractor.

300 tons, men's dormitory, University of South Carolina, to Owen Steel Co., Columbia, S. C.; John Heslep, Columbia, general contractor.

285 tons, state highway structures, Colchester-Marlborough, Conn., to Plantations Steel Co., Providence, R. I.; S. & M. Construction Co., Providence, general contractor.

250 tons, hospital building, Goddard Hospital, Stoughton, Mass., to Bethlehem Steel Co., Bethlehem, Pa.; Tornabene Bros. Co., Newton Upper Falls, Mass., general contractor; 40 tons of structurals to Quincy Iron Works, Boston.

Unstated, 80 by 190-ft Swift power house project, Lewis river, Washington state; for Pacific Power & Light Co., Portland, Oreg.; Guy F. Atkinson Co., South San Francisco, Calif., low at $2,596,848.

REINFORCING BARS PENDING

483 tons, state bridge work, route 108, section 2-B, Camden county, New Jersey, bids July 23; also, 1219 tons of structural steel required.

441 tons, state bridge work, route 101, section 2-B, Morris county, New Jersey, bids July 23.

209 tons, state bridge work, Westmoreland county, Pennsylvania, bids July 26; 150 tons of structural steel also required, as noted previously.

920 tons, state bridge work, Morris county, New Jersey; bids July 16; also required, 110 tons of structural shapes.

140 tons, municipal sewage plant, Seattle; general contract placed.

200 tons, Washington state highway bridge, Pierce county; bids to Olympia, Wash., July 16.

112 tons, also 1280 feet of steel piling, road project; West Coast Steel Co., Portland, Oreg., low at $208,100; to U.S. Engineer, Portland.

Unstated, Oregon state highway projects, low bids as follows: Benton county, 100-ft deck girder bridge, West Coast Steel Co., Portland, Ore., $21,757; Klamath county, rail overcrossing, awarded Knight-Pearcy Co., Salem, Oreg., $32,174; Lincoln county, two reinforced 80-ft bridges, Babler Bros. Inc., Portland, $30,930; Marion county, two 75-ft bridges, Valley Construction Co., Portland, $24,802; Marion-Linn counties, four deck girder bridges, awarded Tom Lillebo, Reedsport, Oreg., $62,641; Marion-Linn counties, five road structures, F. H. McEwen, $322,935; Wallowa county, 70 and 60-ft bridges, $29,975; Coos county, 752-ft rail overcrossing, Coos Bay Dredging Co., $189,342; Harney county, 133-ft highway bridge, awarded Harney Homes, Burns, Oreg., $34,402.

PLATES . . .

PLATES PLACED

6000 tons, 20 miles of 48 and 54-in. water supply pipe for Salem, Oreg., to American Pipe & Construction Co., Portland, Oreg.

4500 tons, 15 and 4-in. pipe for Wahluke project, Washington state, to Gunderson Bros. Engineering Co., Portland, Oreg., for U.S. Bureau of Reclamation.

2500 tons, penstock tunnel liner, Swift power project, Washington state, to American Pipe & Construction Co., Portland, Oreg.

1500 tons, tankage for Georgie-Pacific pulp plant, Toledo, Oreg., to American Pipe & Construction Co., Portland, Oreg.

1500 tons, reduction pots for Aluminum Co. of Canada, Kitimat plant, to American Pipe & Construction Co., Portland, Oreg.

1100 tons, seven LCU units for U.S. Navy, to Gunderson Bros. Engineering Co., Portland, Oreg.

PLATES PENDING

550 tons, Cougar dam, Oregon state, bids probably in October to the U.S. Engineer, Portland, Oreg.

275 tons, 500,000-gal tank, near Linwood, Utah, bids July 25 to the Bureau of Reclamation, Vernal, Utah.

PIPE . . .

CAST IRON PIPE PENDING

1200 tons, system expansion, Kent, Wash.; bids in; alternatives for steel.

800 tons, 24 to 16-in., Bellingham, Wash.; bids July 8.

100 tons, 8 and 6-in.; U.S. Pipe & Foundry Co., Seattle, low to Enumclaw, Wash.

Unstated, 14,000 feet of 8 and 6-in. distribution pipe and fittings; bids to Mabel Waterman, city clerk, Moses Lake, Wash., July 16.

Imported Steel

Prices per 100 lbs. (except where otherwise noted) landed, including customs duty, but no other taxes.

	Atlantic & Gulf Coast	West Coast	Vancouver	Montreal
Deformed Bars (¾" Dia. incl. all extras)	$6.78	$7.01	$6.76	$6.44
Merchant Bars (¼" Round incl. all extras)...	7.62	7.85	7.48	7.22
Bands (1"x⅛"x20' incl. all extras)	7.76	7.98	7.65	7.38
Angles (2"x2"x¼" incl. all extras)	6.57	6.75	6.99	6.69
Beams & Channels (base)	6.82	7.00	7.24	6.94
Furring Channels (C.R. ¾", per 1000')	26 62	27.77	32.77	31.80
Barbed Wire (per 82 lb. net reel)	6.95	7.40	7.75	7.80
Nails (bright, common, 20d and heavier)	8.38	8.58	9.07	8.99
Larssen Sheet Piling (section II, new, incl. size extra)	7.80	8.10	8.10	7.80
Wire, Manufacturer's, bright, low C, (11½ ga.)	7.38	7.52	8.52	8.52
Wire, galvanized, low C, (11½ ga.)	8.01	8.15	9.42	9.42
Wire, Merchant quality, bl. ann., (10 ga.)....	7 60	7.75	8.78	8.78
Rope Wire (.045". 247,000 PSI, incl. extras) ..	13.60	13.75	13.00	13.00
Wire, fine and weaving, low C, (20 ga.)	10.66	10.80	10.17	12.17
Tie Wire, autom. baler (14G, 97 lbs. net)	9.58	9.73	9.64	9.54
Merchant Pipe (½" galv. T & C, per 100')...	8.48	8.83	...	...
Casing (5½", 15.5 J55, T & C, per 100')	194.00	199.00	...	...
Tubing (2⅞". 6.4 J55, EUE, per 100')	103.00	104.00	...	...
Forged R. Turn. Bars, C-1035 (from 10" dl.)	14.00	14.23	14.00	13.74

Ask prices on: Bulb tees, bolts and nuts, manganese steel plates and shapes, welded wire reinforcing mesh and hardware cloth, boiler tubes, A-335-P11 pressure pipe.

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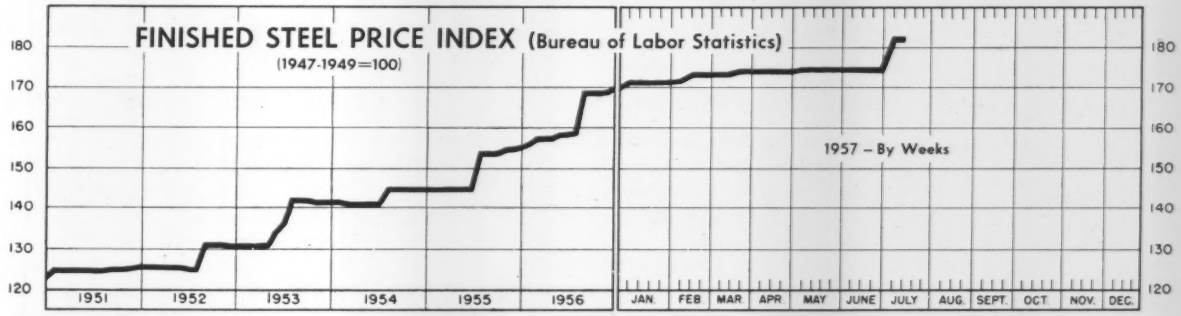
Price Indexes and Composites



July 9, 1957	Week Ago	Month Ago	June Avg.	Year Ago
181.3	180.3	174.3	174.3	158.2

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended July 9

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard, No. 1	$5.600	*Bars, Reinforcing*	6.210
Rails, Light, 40 lb	7.067	*Bars, C.F., Carbon*	10.360
Tie Plates	6.600	*Bars, C.F., Alloy*	13.875
Axles, Railway	9.825	*Bars, C.F., Stainless, 302 (lb)*	0.553
Wheels, Freight Car, 33 in. (per wheel)	60.00	*Sheets, H.R., Carbon*	6.192
Plates, Carbon	6.150	*Sheets, C.R., Carbon*	7.089
Structural Shapes	5.942	*Sheets, Galvanized*	8.220
Bars, Tool Steel, Carbon (lb)	0.480	*Sheets, C.R., Stainless, 302 (lb)*	0.688
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.585	*Sheets, Electrical*	12.108
Bars, Tool Steel, H.R., Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb)	1.274	*Strip, C.R., Carbon*	9.143
Bars, Tool Steel, H.R., Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.769	*Strip, C.R., Stainless, 430 (lb)*	0.493
Bars, H.R., Alloy	10.525	*Strip, H.R., Carbon*	6.245
Bars, H.R., Stainless, 303 (lb)	0.525	*Pipe, Black, Buttweld (100 ft)*	19.814
Bars, H.R., Carbon	6.425	*Pipe, Galv., Buttweld (100 ft)*	23.264
		Pipe, Line (100 ft)	199.025
		Casing, Oil Well, Carbon (100 ft)	194.499
		Casing, Oil Well, Alloy (100 ft)	304.610
Tubes, Boiler (100 ft)	47.653	Black Plate, Canmaking Quality (95 lb base box)	7.583
Tubing, Mechanical, Carbon (100 ft)	24.470	*Wire, Drawn, Carbon*	10.225
Tubing, Mechanical, Stainless, 304 (100 ft)	199.735	*Wire, Drawn, Stainless, 430 (lb)*	0.656
Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	9.783	*Bale Ties (bundle)*	7.967
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.483	*Nails, Wire, 8d Common*	9.828
		Wire, Barbed (80-rod spool)	8.717
		Woven Wire Fence (20-rod roll)	21.740

STEEL's FINISHED STEEL PRICE INDEX*

	July 10 1957	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	239.15	239.15	228.59	210.45	171.92
Index in cents per lb	6.479	6.479	6.193	5.701	4.657

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$145.74	$145.74	$140.24	$130.32	$106.32
No. 2 Fdry Pig Iron, GT	64.70	64.70	64.70	60.84	52.54
Basic Pig Iron, GT	64.23	64.23	64.23	59.96	52.16
Malleable Pig Iron, GT	65.77	65.77	65.77	61.45	53.27
Steelmaking Scrap, GT	53.17	55.33	55.67	45.50	42.50

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	July 10 1957	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.425	5.425	5.075	4.65	3.70
Bars, H.R., Chicago	5.425	5.425	5.075	4.65	3.70
Bars, H.R., deld., Philadelphia	5.715	5.715	5.365	4.93	4.252
Bars, C.F., Pittsburgh	7.30*	7.30*	6.85*	6.25*	4.55
Shapes, Std., Pittsburgh	5.275	5.275	5.00	4.60	3.65
Shapes, Std., Chicago	5.275	5.275	5.00	4.60	3.65
Shapes, deld., Philadelphia	5.585	5.585	5.31	5.00	3.93
Plates, Pittsburgh	5.10	5.10	4.85	4.50	3.70
Plates, Chicago	5.10	5.10	4.85	4.50	3.70
Plates, Coatesville, Pa.	5.50	5.50	5.25	4.80	4.15
Plates, Sparrows Point, Md.	5.10	5.10	4.85	4.50	3.70
Plates, Claymont, Del.	5.70	5.70	5.70	5.35	4.15
Sheets, H.R., Pittsburgh	4.925	4.925	4.675	4.325	3.60-3.75
Sheets, H.R., Chicago	4.925	4.925	4.675	4.325	3.60
Sheets, C.R., Pittsburgh	6.05	6.05	5.75	5.325	4.35
Sheets, C.R., Chicago	6.05	6.05	5.75	5.325	4.35
Sheets, C.R., Detroit	6.05-6.15	5.75-5.85	5.75-5.85	5.325-5.425	4.55
Sheets, Galv., Pittsburgh	6.60	6.60	6.30	5.85	4.80
Strip, H.R., Pittsburgh	4.925	4.925	4.675	4.325	3.75-4.00
Strip, H.R., Chicago	4.925	4.925	4.675	4.325	3.50
Strip, C.R., Pittsburgh	7.15	7.15	6.85	6.25	4.65-5.35
Strip, C.R., Chicago	7.15	7.15	6.85	6.25-6.35	4.90
Strip, C.R., Detroit	7.25	6.95	6.95	6.35	4.85-5.60
Wire, Basic, Pittsburgh	7.65	7.65	7.20	6.60	4.85-5.10
Nails, Wire, Pittsburgh	8.95	8.95	8.49	7.60	5.90-6.20
Tin plate (1.50 lb) box, Pitts.	$10.30	$10.30	$10.30	$9.85	$8.70

*Including 0.35c for special quality.

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$96.00	$96.00	$91.50	$84.50	$66.00
Wire rods, ½-⅝" Pitts.	6.15	6.15	5.80	5.375	4.10-4.30

PIG IRON, Gross Ton	July 10 1957	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pitts.	$65.50	$65.50	$65.50	$62.25	$53.00
Basic, Valley	64.50	64.50	64.50	60.00	52.00
Basic, deld., Phila.	68.38	68.38	68.38	63.75	56.75
No. 2 Fdry, NevilleIsland, Pa.	65.00	65.00	65.00	63.00	52.50
No. 2 Fdry, Chicago	65.00	65.00	65.00	60.50	52.50
No. 2 Fdry, deld., Phila.	68.88	68.88	68.88	64.26	57.25
No. 2 Fdry, Birm.	60.25	59.00	59.00	57.00	48.88
No. 2 Fdry (Birm.) deld. Cin.	66.70	66.70	66.70	62.70	56.43
Malleable, Valley	65.00	65.00	65.00	60.50	52.50
Malleable, Chicago	65.00	65.00	65.00	60.50	52.50
Ferromanganese, Duquesne	255.00†	255.00†	255.00†	215.00†	188.00*

†74-76% Mn, net ton. *75-82% Mn, gross ton, Etna, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$56.50	$56.50	$56.50	$43.50	$44.00
No. 1 Heavy Melt, E. Pa.	56.00	56.00	56.50	47.00	41.00
No. 1 Heavy Melt, Chicago	53.00	53.50	54.00	46.00	42.50
No. 1 Heavy Melt, Valley	54.50	54.50	54.50	44.50	44.00
No. 1 Heavy Melt, Cleve.	51.50	51.50	51.50	42.50	43.00
No. 1 Heavy Melt, Buffalo	46.50	46.50	46.50	42.50	37.00
Rails, Rerolling, Chicago	76.50	74.50	66.50	67.50	52.50
No. 1 Cast, Chicago	47.50	47.50	46.50	45.50	45.00

COKE, Net Ton					
Beehive, Furn., Connlsvl.	$15.25	$15.25	$15.25	$14.125	$14.75
Beehive, Fdry., Connlsvl.	18.00	18.00	18.00	16.50	17.50

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PRESSURES TO 200 PSI . . . SWIVEL FLANGE FOR EASY INSTALLATION

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Penflex Suction and Discharge Hose has been thoroughly tested and is used by leading industries throughout the nation for all-purpose duty. It is proved and approved the all-purpose hose for oil, gasoline, solvents, corrosive chemicals and other volatiles and liquids. Available in sizes 2" to 12" I.D. in galvanized steel, stainless steel and bronze pressure carrier. Write for complete details.

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FLEXIBLE TUBING, AUTOMATIC BARREL FILLERS, PNEUMATIC RIVET PASSERS, ACCESSORIES AND FITTINGS

Steel Prices

Mill prices as reported to STEEL, July 10, cents per pound except as otherwise noted. Code numbers following mill points indicate producing company. Key to producers, page 170; to footnotes, page 172. *Changes shown in italics.*

SEMIFINISHED

INGOTS, Carbon, Forging (NT)

Munhall,Pa. U5 ..... $73.50

INGOTS, Alloy (NT)

Detroit S41 ..... $77.00
Midland,Pa. C18 ..... 74.00
Munhall,Pa. U5 ..... 77.00

BILLETS, BLOOMS & SLABS

Carbon, Rerolling (NT)

Bessemer,Pa. U5 ....$77.50
Bridgeport,Conn. N19 ..80.50
Buffalo R2 ..... 77.50
Clairton,Pa. U5 ..... 77.50
Ensley,Ala. T2 ..... 77.50
Fairfield,Ala. T2 ..... 77.50
Fontana,Calif. K1 ....88.00
Gary,Ind. U5 ..... 77.50
Johnstown,Pa. B2 .... 77.50
Lackawanna,N.Y. B2 ..77.50
Munhall,Pa. U5 ..... 77.50
S.Chicago,Ill. R2, U5 ..77.50
S.Duquesne,Pa. U5 .... 77.50
Sterling,Ill. N15 ..... 77.50
Youngstown R2 ..... 77.50

Carbon, Forging (NT)

Bessemer,Pa. U5 ....$96.00
Bridgeport,Conn. N19 ..101.00
Buffalo R2 ..... 96.00
Canton,O. R2 ..... 98.50
Clairton,Pa. U5 ..... 96.00
Conshohocken,Pa. A3 101.00
Ensley, Ala. T2 ..... 96.00
Fairfield,Ala. T2 ..... 96.00
Fontana,Calif. K1 ....105.50
Gary,Ind. U5 ..... 96.00
Geneva,Utah C11 .... 96.00
Houston S5 ..... 101.00
Johnstown,Pa. B2 ..... 96.00
Lackawanna,N.Y. B2 ..96.00
LosAngeles B3 ..... 105.50
Midland,Pa. C18 ..... 91.50
Munhall,Pa. U5 ..... 96.00
Seattle B3 ..... 109.50
S.Chicago R2,U5,W14 96.00
S.Duquesne,Pa. U5 .... 96.00
S.SanFrancisco B3 .... 105.50
Warren,O. C17 ..... 96.00

Alloy, Forging (NT)

Bethlehem,Pa. B2 ...$114.00
Bridgeport,Conn. N19. 114.00
Buffalo R2 ..... 114.00
Canton,O. R2, T7 .... 114.00
Conshohocken,Pa. A3 121.00
Detroit S41 ..... 114.00
Fontana,Calif. K1 ....135.00
Gary,Ind. U5 ..... 114.00
Houston S5 ..... 119.00
Ind.Harbor,Ind. Y1 ..114.00
Johnstown,Pa. B2 .... 114.00
Lackawanna,N.Y. B2 114.00
LosAngeles B3 ..... 134.00
Massillon,O. R2 ..... 114.00
Midland,Pa. C18 .... 107.00
Munhall,Pa. U5 ..... 114.00
S.Chicago R2,U5,W14 114.00
S.Duquesne,Pa. U5 ..114.00
Struthers,O. Y1 ..... 114.00
Warren,O. C17 ..... 114.00

ROUNDS, SEAMLESS TUBE (NT)

Bridgeport,Conn. N19 $122.50
Buffalo R2 ..... 117.50
Canton,O. R2 ..... 120.00
Cleveland,O. R2 ..... 117.50
Gary,Ind. U5 ..... 117.50
S.Chicago,Ill. R2, W14 117.50
S.Duquesne,Pa. U5 ..117.50
Warren,O. C17 ..... 117.50

SKELP

Aliquippa,Pa. J5 ..... 4.725
LoneStar,Tex. L6 .... 5.025
Munhall,Pa. U5 ..... 4.875
Warren,O. R2 ..... 4.875
Youngstown R2, U5 ..4.875

WIRE RODS

AlabamaCity,Ala. R2 ..6.15
Aliquippa,Pa. J5 ..... 5.80
Alton,Ill. L1 ..... 6.35
Buffalo W12 ..... 5.80
Cleveland A7 ..... 6.15
Donora,Pa. A7 ..... 6.15
Fairfield,Ala. T2 ..... 6.15
Houston S5 ..... 6.40
IndianaHarbor,Ind. Y1..6.15
Johnstown,Pa. B2 ..... 6.15
Joliet,Ill. A7 ..... 6.15
KansasCity,Mo. S5 ..... 6.40
Kokomo,Ind. C16 ..... 6.25
LosAngeles B3 ..... 6.95
Minnequa,Colo. C10 .... 6.40
Monessen,Pa. P17 ..... 5.80
N.Tonawanda,N.Y. B11..5.80
Pittsburg,Calif. C11 .... 6.95
Portsmouth,O. P12 ..... 6.15
Roebling,N.J. R5 ..... 5.90
S.Chicago,Ill. R2 ..... 6.15
SparrowsPoint,Md. B2 ..6.25
Sterling,Ill.(1) N15 .... 6.15
Sterling,Ill. N15 ..... 6.25
Struthers,O. Y1 ..... 6.15
Worcester,Mass. A7 .... 6.45

STRUCTURALS

Carbon Steel Std. Shapes

Ala.City,Ala. R2 .... 5.275
Atlanta A11 ..... 5.20
Aliquippa,Pa. J5 ..... 5.00
Bessemer,Ala. T2 .... 5.275
Bethlehem,Pa. B2 .... 5.325
Birmingham C15 ..... 5.275
Clairton,Pa. U5 ..... 5.275
Fairfield Ala. T2 ..... 5.275
Fontana,Calif. K1 ..... 6.025
Gary,Ind. U5 ..... 5.275
Geneva,Utah C11 ..... 5.275
Houston S5 ..... 5.375
Ind.Harbor Ind. I-2 .. 5.275
Johnstown,Pa. B2 .... 5.325
Joliet,Ill. P22 ..... 5.275
KansasCity,Mo. S5 ..... 5.375
Lackawanna,N.Y. B2 .. 5.325
LosAngeles B3 ..... 5.975
Minnequa,Colo. C10 ..... 5.575
Munhall,Pa. U5 ..... 5.275
Niles,Calif. P1 ..... 5.65
Phoenixville,Pa. P4 ..... 5.50
Portland,Oreg. O4 ..... 6.025
Seattle B3 ..... 6.025
S.Chicago,Ill. U5, W14 5.275
S.SanFrancisco B3 ..... 5.925
Sterling,Ill. N15 ..... 5.275
Torrance,Calif. C11 .... 5.975
Weirton,W.Va. W6 ..... 5.275

Wide Flange

Bethlehem,Pa. B2 .... 5.325
Clairton,Pa. U5 ..... 5.275
Fontana,Calif. K1 ..... 6.225
IndianaHarbor,Ind. I-2 5.525
Lackawanna,N.Y. B2 .. 5.325
Munhall,Pa. U5 ..... 5.275
Phoenixville,Pa. P4 ..... 5.50
S.Chicago,Ill. U5 ..... 5.275

Alloy Std. Shapes

Aliquippa,Pa. J5 ..... 6.20
Clairton,Pa. U5 ..... 6.20
Gary,Ind. U5 ..... 6.20
Houston S5 ..... 6.65
Munhall,Pa. U5 ..... 6.20
S.Chicago,Ill. U5 ..... 6.20

H.S., L.A. Std. Shapes

Aliquippa,Pa. J5 ..... 7.35
Bessemer,Ala. T2 ..... 7.75
Bethlehem,Pa. B2 ..... 7.80
Clairton,Pa. U5 ..... 7.75
Fairfield Ala. T2 ..... 7.75
Fontana,Calif. K1 ..... 8.50
Gary,Ind. U5 ..... 7.75
Geneva,Utah C11 ..... 7.35
Houston S5 ..... 7.85
Ind.Harbor,Ind. I-2, Y1 7.75
Johnstown,Pa. B2 ..... 7.80
KansasCity,Mo. S5 ..... 7.85
Lackawanna,N.Y. B2 .. 7.80
LosAngeles B3 ..... 8.45
Munhall,Pa. U5 ..... 7.75
Seattle B3 ..... 8.50
S.Chicago,Ill. U5, W14 7.75
S.SanFrancisco B3 ..... 8.40
Struthers,O. Y1 ..... 7.75

H.S., L.A. Wide Flange

Bethlehem,Pa. B2 ..... 7.80
Lackawanna,N.Y. B2 .. 7.80
Munhall,Pa. U5 ..... 7.75
S.Chicago,Ill. U5 ..... 7.75

PILING

BEARING PILES

Bethlehem,Pa. B2 .... 5.325
Lackawanna,N.Y. B2 .. 5.325
Munhall,Pa. U5 ..... 5.275
S.Chicago,Ill. U5 ..... 5.275

STEEL SHEET PILING

Lackawanna,N.Y. B2 ..6.225
Munhall,Pa. U5 ..... 6.225
S.Chicago,Ill. U5 ..... 6.225

PLATES

PLATES, Carbon Steel

Ala.City,Ala. R2 ..... 5.10
Aliquippa,Pa. J5 ..... 4.85
Ashland,Ky. (15) A10 5.10
Bessemer,Ala. T2 ..... 5.10
Clairton,Pa. U5 ..... 5.10
Claymont,Del. C22 .... 5.70
Cleveland J5, R2 ..... 5.20
Coatesville,Pa. L7 ..... 5.50
Conshohocken,Pa. A3 ..5.20
Ecorse,Mich. G5 ..... 5.20
Fairfield,Ala. T2 ..... 5.10
Fontana,Calif.(30) K1 ..5.85
Gary,Ind. U5 ..... 5.10
Geneva,Utah C11 ..... 5.10
GraniteCity,Ill. G4 ..... 5.30
Harrisburg,Pa. P4 .... 5.80
Houston S5 ..... 5.20
Ind.Harbor,Ind. I-2, Y1 5.10
Johnstown,Pa. B2 ..... 5.10
Lackawanna,N.Y. B2 .. 5.10
LoneStar,Tex. L6 ..... 5.45
Mansfield,O. E6 ..... 5.10
Minnequa,Colo. C10 .... 5.95
Munhall,Pa. U5 ..... 5.10
Newport,Ky. A2 ..... 5.10
Pittsburgh J5 ..... 4.85
Riverdale Ill. A1 ..... 5.10
Seattle B3 ..... 6.00
Sharon,Pa. S3 ..... 4.85
S.Chicago,Ill. U5, W14 5.10
SparrowsPoint,Md. B2 ..5.10
Sterling,Ill. N15 ..... 5.10
Steubenville,O. W10 .... 5.10
Warren,O. R2 ..... 5.10
Youngstown R2, U5, Y1.5.10

PLATES, Carbon Abras. Resist.

Claymont,Del. C22 .... 7.35
Fontana,Calif. K1 ..... 7.50
Geneva, Utah C11 .... 6.75
Johnstown,Pa. B2 ..... 7.00
SparrowsPoint,Md. B2 .. 7.00

PLATES, Wrought Iron

Economy,Pa. B14 ..... 11.95

PLATES, H.S., L.A.

Aliquippa,Pa. J5 ..... 7.25
Bessemer,Ala. T2 ..... 7.625
Clairton,Pa. U5 ..... 7.625
Claymont,Del. C22 .... 7.625
Cleveland J5, R2 .... 7.625
Coatesville,Pa. L7 .... 7.55
Conshohocken,Pa. A3.. 7.625
Ecorse,Mich. G5 ..... 7.725
Fairfield,Ala. T2 ..... 7.625
Fontana,Calif.(30) K1 .. 8.375
Gary,Ind. U5 ..... 7.625
Geneva,Utah C11 ..... 7.625
Houston S5 ..... 7.725
Ind.Harbor,Ind. I-2, Y1 7.625
Johnstown,Pa. B2 .... 7.625
Munhall,Pa. U5 ..... 7.625
Pittsburgh J5 ..... 7.25
Seattle B3 ..... 8.525
Sharon,Pa. S3 ..... 7.25
S.Chicago,Ill. U5, W14 7.625
SparrowsPoint,Md. B2 7.625
Warren,O. R2 ..... 7.625
Youngstown U5, Y1 ..7.625

PLATES, Alloy

Aliquippa,Pa. J5 ..... 6.85
Claymont,Del. C22 ..... 7.20
Coatesville,Pa. L7 ..... 7.20
Fontana,Calif.(30) K1 ..7.95
Gary,Ind. U5 ..... 7.20
Houston S5 ..... 7.30
Ind.Harbor,Ind. Y1 .... 7.20
Johnstown,Pa. B2 ..... 7.20
Munhall,Pa. U5 ..... 7.20
Newport,Ky. A2 ..... 7.20
Pittsburgh J5 ..... 6.85
Seattle B3 ..... 8.10
Sharon,Pa. S3 ..... 6.85
S.Chicago,Ill. U5, W14 7.20
SparrowsPoint,Md. B2 .7.20
Youngstown Y1 ..... 7.20

FLOOR PLATES

Cleveland J5 ..... 5.925
Conshohocken,Pa. A3 ..6.175
Harrisburg,Pa. P4 .... 6.275
Ind.Harbor,Ind. I-2 ..6.175
Munhall,Pa. U5 ..... 6.175
S.Chicago,Ill. U5 ..... 6.175

PLATES, Ingot Iron

Ashland c.l. (15) A10 ..5.35
Ashland l.c.l. (15) A10 .5.85
Cleveland c.l. R2 ..... 5.85
Warren,O. c.l. R2 ..... 5.85

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)

Ala.City,Ala.(9) R2 ..5.425
Aliquippa,Pa.(9) J5 ...5.075
Alton,Ill. L1 ..... 5.625
Atlanta(9) A11 ..... 5.275
Bessemer,Ala.(9) T2 ..5.425
Birmingham(9) C15 ..... 5.425
Bridgeport,Conn.(9) N19 . 5.65
Buffalo(9) R2 ..... 5.425
Clairton,Pa.(9) U5 .... 5.425
Cleveland(9) R2 ..... 5.425
Ecorse,Mich.(9) G5 ..... 5.525
Emeryville,Calif. J7 ... 5.825
Fairfield,Ala.(9) T2 .. 5.425
Fairless,Pa.(9) U5 .... 5.575
Fontana,Calif.(9) K1 ..6.125
Gary,Ind.(9) U5 ..... 5.425
Houston(9) S5 ..... 5.675
Ind.Harbor(9) I-2, Y1 5.425
Johnstown,Pa.(9) B2 .. 5.425
Joliet,Ill. P22 ..... 5.425
KansasCity,Mo.(9) S5 .. 5.675
Lackawanna(9) B2 .... 5.425
LosAngeles(9) B3 ..... 6.125
Milton,Pa. M18 ..... 5.575
Minnequa,Colo. C10 ..... 5.875
Niles,Calif. P1 ..... 5.775
N.Tonawanda,N.Y.(9)B11 5.425
Pittsburg Calif.(9) C11 6.125
Pittsburgh(9) J5 .... 5.075
Portland,Oreg. O4 ..... 6.175
Seattle B3, N14 ..... 6.175
S.Ch'c'go(9)R2,U5,W14 5.425
S.Duquesne,Pa.(9) U5 .. 5.425
S.SanFran.,Calif.(9) B3 6.175
Sterling,Ill.(1) N15 .... 5.425
Sterling,Ill. N15 ..... 5.525
Struthers,O. Y1 ..... 5.425
Tonawanda,N.Y. B12 ...5.45
Torrance,Calif.(9) C11 6.125
Youngstown(9) R2, U5 5.425

BARS, H.R. Leaded Alloy (including leaded extra)

Warren,O. C17 ..... 7.475

BARS, Hot-Rolled Alloy

Aliquippa,Pa. J5 ..... 6.125
Bethlehem Pa. B2 ..... 6.475
Bridgeport,Conn. N19 ... 6.55
Buffalo R2 ..... 6.475
Canton,O. R2, T7 ..... 6.475
Clairton,Pa. U5 ..... 6.475
Detroit S41 ..... 6.475
Ecorse,Mich. G5 ..... 6.575
Fairless,Pa. U5 ..... 6.625
Fontana,Calif. K1 ..... 7.525
Gary,Ind. U5 ..... 6.475
Houston S5 ..... 6.725
Ind.Harbor,Ind. I-2, Y1 6.475
Johnstown,Pa. B2 .... 6.475
KansasCity,Mo. S5 ..... 6.725
Lackawanna,N.Y. B2 .. 6.475
LosAngeles B3 ..... 7.525
Massillon,O. R2 ..... 6.475
Midland,Pa. C18 ..... 6.125
Pittsburgh J5 ..... 6.125
S.Chicago R2, U5, W14 6.475
S.Duquesne,Pa. U5 .... 6.475
Struthers,O. Y1 ..... 6.475
Warren,O. C17 ..... 6.475
Youngstown U5 ..... 6.475

BARS & SMALL SHAPES, H.R. High-Strength Low-Alloy

Aliquippa,Pa. J5 ..... 7.425
Bessemer,Ala. T2 ..... 7.925
Bethlehem,Pa. B2 ..... 7.425
Bridgeport,Conn. N19 ... 7.95
Clairton,Pa. U5 ..... 7.925
Cleveland R2 ..... 7.925
Ecorse,Mich. G5 ..... 8.025
Fairfield,Ala. T2 ..... 7.925
Fontana,Calif. K1 ..... 8.625
Gary,Ind. U5 ..... 7.925
Houston S5 ..... 8.175
Ind.Harbor,Ind. Y1 .... 7.925
Johnstown,Pa. B2 ..... 7.425
KansasCity,Mo. S5 ..... 8.175
Lackawanna,N.Y. B2 .. 7.425
LosAngeles B3 ..... 8.625
Pittsburgh J5 ..... 7.425
Seattle B3 ..... 8.675
S.Chicago,Ill. U5, W14 7.925
S.Duquesne,Pa. U5 .... 7.925
S.SanFrancisco B3 ..... 8.675
Struthers,O. Y1 ..... 7.925
Youngstown U5 ..... 7.925

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa.(9) B2 ...5.575
Houston(9) S5 ..... 5.675
KansasCity,Mo.(9) S5 ... 5.675
Lackawanna(9) B2 .... 5.425
Sterling,Ill. N15 ..... 5.525
Sterling,Ill.(1) N15 .... 5.425
Tonawanda,N.Y. B12 ...5.45

BAR SIZE ANGLES; S. Shapes

Aliquippa,Pa. J5 .... 5.075
Atlanta A11 ..... 5.575
Joliet,Ill. P22 ..... 5.075
Niles,Calif. P1 ..... 5.85
Pittsburgh J5 ..... 5.075
Portland,Oreg. O4 ..... 6.175
SanFrancisco S7 ..... 5.95

BAR SHAPES, Hot-Rolled Alloy

Aliquippa,Pa. J5 ..... 6.20
Clairton,Pa. U5 ..... 6.55
Gary,Ind. U5 ..... 6.55
Houston S5 ..... 6.80
KansasCity,Mo. S5 ..... 6.80
Pittsburgh J5 ..... 6.20
Youngstown U5 ..... 6.55

BARS, C.F., Leaded Alloy (Including leaded extra)

Ambridge,Pa. W18 .... 9.475
BeaverFalls,Pa. M12 ... 9.925
Chicago W18 ..... 9.475
Cleveland C20 ..... 9.475
LosAngeles P2, S30 (Gr. A) 11.30
(Gr. B) 11.80
Monaca,Pa. S17 ..... 9.925
Newark,N.J. W18 ..... 9.65
Warren,O. C17 ..... 9.925

BARS, Cold-Finished Carbon

Ambridge,Pa. W18 ..... 7.30
BeaverFalls,Pa. M12,R2 7.30
Birmingham C15 ..... 7.90
Bridgeport,Conn. N19 .... 7.65
Buffalo B5 ..... 7.85
Camden,N.J. P13 ..... 7.30
Carnegie,Pa. C12 ..... 7.30
Chicago W18 ..... 6.85
Cleveland A7, C20 ..... 7.30
Detroit B5, P17 ..... 7.50
Detroit S41 ..... 7.30
Donora,Pa. A7 ..... 7.30
Elyria,O. W8 ..... 7.30
FranklinPark,Ill. N5 ... 6.85
Gary,Ind. R2 ..... 7.30
GreenBay,Wis. F7 ..... 7.30
Hammond,Ind. L2, M13 7.30
Hartford,Conn. R2 ..... 7.80
Harvey,Ill. B5 ..... 7.30
LosAngeles S30 ..... 8.75
LosAngeles R2 ..... 9.20
LosAngeles P2 ..... 8.75
Mansfield,Mass. B5 ..... 7.85
Massillon,O. R2 ..... 7.30
Massillon,O. R8 ..... 6.85
Midland,Pa. C18 ..... 6.85
Monaca,Pa. S17 ..... 7.30
Newark,N.J. W18 ..... 7.75
NewCastle,Pa.(17) B4 ... 7.30
Pittsburgh J5 ..... 6.85
Plymouth,Mich. P5 ..... 7.55
Putnam,Conn. W18 ..... 7.85
Readville,Mass. C14 ..... 7.85
S.Chicago,Ill. W14 .... 7.30
SpringCity,Pa. K3 .... 7.30
Struthers,O. Y1 ..... 7.30
Waukegan,Ill. A7 ..... 7.30
Youngstown F3, Y1 .... 7.30

BARS, Cold-Finished Carbon (Turned and Ground)

Cumberland,Md.(5) C19.6.10

BARS, Cold-Finished Alloy

Ambridge,Pa. W18 ..... 8.775
BeaverFalls,Pa.M12,R2 8.775
Bethlehem,Pa. B2 ..... 8.775
Bridgeport,Conn. N19 .... 8.925
Buffalo B5 ..... 8.775
Camden,N.J. P13 ..... 8.50
Canton,O. T7 ..... 8.775
Carnegie,Pa. C12 ..... 8.775
Chicago W18 ..... 8.325
Cleveland A7, C20 ..... 8.325
Detroit B5, P17 ..... 8.975
Detroit S41 ..... 8.775
Donora,Pa. A7 ..... 8.325
Elyria,O. W8 ..... 8.775
FranklinPark,Ill. N5 .. 8.325
Gary,Ind. R2 ..... 8.775
GreenBay,Wis. F7 ..... 8.775
Hammond,Ind. L2, M13 8.775
Hartford,Conn. R2 .... 9.075
Harvey,Ill. B5 ..... 8.775
Lackawanna,N.Y. B2 ..... 8.775
Los Angeles P2, S30 .... 10.65
Mansfield,Mass. B5 ..... 9.075
Massillon,O. R2 ..... 8.775
Massillon,O. R8 ..... 8.325
Midland,Pa. C18 ..... 8.325
Monaca,Pa. S17 ..... 8.775
Newark,N.J. W18 ..... 8.95
Plymouth,Mich. P5 ..... 8.975
S.Chicago W14 ..... 8.775
SpringCity,Pa. K3 .... 8.50
Struthers,O. Y1 ..... 8.775
Warren,O. C17 ..... 8.775
Waukegan,Ill. A7 ..... 8.325
Worcester,Mass. A7 .... 8.625
Youngstown F3, Y1 .... 8.775

BARS, Reinforcing (To Fabricators)

Ala.City,Ala. R2 ..... 5.425
Atlanta A11 ..... 5.275
Birmingham C15 ..... 5.425
Bridgeport,Conn. N19 .... 5.65
Buffalo R2 ..... 5.425
Cleveland R2 ..... 5.425
Ecorse,Mich. G5 ..... 5.775
Emeryville,Calif. J7 .. 5.825

Fairfield,Ala. T2 .....5.425
Fairless,Pa. U5 .....5.575
Fontana,Calif. K1 ....5.775
Ft.Worth,Tex.(4)(26)T4 5.875
Gary,Ind. U5 .....5.425
Houston S5 .....5.675
Ind.Harbor,Ind. I-2,Y1 5.425
Johnstown,Pa. B2 ....5.425
Joliet,Ill. P22 .....5.425
KansasCity,Mo. S5 .....5.675
Lackawanna,N.Y. B2 ..5.425
LosAngeles B3 .....6.125
Milton,Pa. M18 .....5.575
Minnequa,Colo. C10 ..5.875
Niles,Calif. P1 .....5.775
Pittsburg,Calif. C11 ..6.125
Pittsburgh J5 .....5.075
Portland,Oreg. O4 .....6.175
SandSprings,Okla. S5 ..5.925
Seattle B3, N14 .....6.175
S.Chicago,Ill. R2 ....5.425
S.Duquesne,Pa. U5 ...5.425
S.SanFrancisco B3 .....6.175
SparrowsPoint,Md. B2 .5.425
Sterling,Ill.(1) N15 ..5.425
Sterling,Ill. N15 .....5.525
Struthers,O. Y1 .....5.425
Tonawanda,N.Y. B12 ..5.65
Torrance,Calif. C11 ....6.125
Youngstown R2, U5 ..5.425

BARS, Reinforcing
(Fabricated; to Consumers)

Boston B2 .....7.30
Chicago U8 .....6.91
Cleveland U8 .....6.89
Johnstown,Pa. ¼-1" B2 6.73
KansasCity,Mo. S5 ....7.00
Lackawanna,N.Y. B2 ..6.50
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.55
Pittsburgh J5, U8 .....7.10
Seattle N14 .....7.70
Seattle B3 .....7.20
SparrowsPt. ½-1" B2 ..6.73
Williamsport,Pa. S19 ..6.85

RAIL STEEL BARS

ChicagoHts.(3) C2, I-2 5.325
ChicagoHts.(4) (44) I-2 5.425
ChicagoHts.(4) C2 ....5.075
Ft.Worth,Tex.(26) T4 ..5.875
Franklin,Pa.(3) F5 ....5.325
Franklin,Pa.(4) F5 ....5.425
JerseyShore,Pa.(4) J8 ..5.10
Marion,O.(3) P11 ....5.10
Tonawanda(3) B12 ....5.15
Tonawanda(4) B12 ....5.65
Williamsport,Pa.(3) S19.5.15

Bars, Wrought Iron

Economy,Pa.(S.R.)B14 13.15
Economy,Pa.(D.R.)B14 16.35
Economy(Staybolt)B14 16.80

SHEETS

SHEETS, Hot-Rolled Steel
(18 Gage and Heavier)

Ala.City,Ala. R2 .....4.925
Allenport,Pa. P7 .....4.675
Ashland,Ky.(8) A10 ...4.925
Cleveland J5, R2 ....4.925
Conshohocken,Pa. A3 ..4.975
Detroit(8) M1 .....5.025
Ecorse,Mich. G5 .....5.025
Fairfield,Ala. T2 ....4.925
Fairless,Pa. U5 .....4.975
Fontana,Calif. K1 ....5.775
Gary,Ind. U5 .....4.925
Geneva,Utah C11 ....5.025
GraniteCity,Ill.(8) G4 ..5.125
Ind.Harbor,Ind. I-2,Y1 4.925
Irvin,Pa. U5 .....4.925
Lackawanna,N.Y. B2..4.675
Mansfield,O. E6 .....4.925
Munhall,Pa. U5 .....4.925
Newport,Ky.(8) A2 ..4.925
Niles,O. M21 .....4.925
Pittsburg,Calif. C11 ..5.625
Pittsburgh J5 .....4.675
Portsmouth,O. P12 ....4.925
Riverdale,Ill. A1 ....4.925
Sharon,Pa. S3 .....4.675
S.Chicago,Ill. W14 ....4.925
SparrowsPoint,Md. B2..4.675
Steubenville,O. W10 ...4.925
Warren,O. R2 .....4.925
Weirton,W.Va. W6 ....4.925
Youngstown U5, Y1..4.925

SHEETS, H.R., (19 Ga.& Lighter)

Niles,O. M21 .....6.05

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.10
Ind.Harbor,Ind. Y1 ....8.10
Irvin,Pa. U5 .....8.10
Newport,Ky. A2 .....8.10
Youngstown U5, Y1 ....8.10

SHEETS, H.R. (14 Ga.& Heavier)
High-Strength, Low-Alloy

Cleveland J5, R2 ....7.275
Conshohocken,Pa. A3..7.325
Ecorse,Mich. G5 .....7.375
Fairfield,Ala. T2 ....7.275
Fairless,Pa. U5 .....7.325
Fontana,Calif. K1 .....8.125
Gary,Ind. U5 .....7.275
Ind.Harbor,Ind. I-2,Y1 7.275
Irvin,Pa. U5 .....7.275
Lackawanna(35) B2 ..7.275
Munhall,Pa. U5 .....7.275
Pittsburgh J5 .....6.90
S.Chicago,Ill. U5,W14 7.275
SparrowsPoint(36) B2..7.275
Warren,O. R2 .....7.275
Weirton,W.Va. W6 ....7.275
Youngstown U5, Y1 ..7.275

SHEETS, Hot-Rolled Ingot Iron
(18 Gage and Heavier)

Ashland,Ky.(8) A10 ...5.175
Cleveland R2 .....5.675
Warren,O. R2 .....5.675

SHEETS, Cold-Rolled Steel
(Commercial Quality)

Allenport,Pa. P7 .....5.75
Cleveland J5, R2 .....6.05
Conshohocken,Pa. A3 ..6.10
Detroit M1 .....6.05
Ecorse,Mich. G5 .....6.15
Fairfield,Ala. T2 .....6.05
Fairless,Pa. U5 .....6.10
Follansbee,W.Va. F4 ....6.05
Fontana,Calif. K1 .....7.30
Gary,Ind. U5 .....6.05
GraniteCity,Ill. G4 .....6.25
Ind.Harbor,Ind. I-2, Y1 6.05
Irvin,Pa. U5 .....6.05
Lackawanna,N.Y. B2 ..5.75
Mansfield,O. E6 .....6.05
Middletown,O. A10 ....6.05
Newport,Ky. A2 .....6.05
Pittsburg,Calif. C11 ...7.00
Pittsburgh J5 .....5.75
Portsmouth,O. P12 .....6.05
SparrowsPoint,Md. B2 ..5.75
Steubenville,O. W10 ....5.75
Warren,O. R2 .....6.05
Weirton,W.Va. W6 .....6.05
Yorkville,O. W10 .....5.75
Youngstown Y1 .....6.05

SHEETS, Cold-Rolled
High-Strength, Low-Alloy

Cleveland J5, R2 ....8.975
Ecorse,Mich. G5 .....9.075
Fairless,Pa. U5 .....9 025
Fontana,Calif. K1 ....10.275
Gary,Ind. U5 .....8.975
IndianaHarbor,Ind. Y1 8.975
Irvin,Pa. U5 .....8.975
Lackawanna(37) B2 ..8.975
Pittsburgh J5 .....8.525
SparrowsPoint(38) B2 8.975
Warren,O. R2 .....8.975
Weirton,W.Va. W6 ....8.975
Youngstown Y1 .....8.975

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....6.80
Middletown,O. A10 .....6.55
Warren,O. R2 .....6.80

SHEETS, Culvert

	Cu Steel	Cu Fe
Ashland,Ky. A10	.6.95	7.20
Canton,O. R2	*.6.95*	*7.45*
Fairfield T2	*.6.95*	*7.20*
Gary,Ind. U5	*.6.95*	*7.20*
GraniteCity,Ill. G4	*7.15*	
Ind.Harbor I-2	..6.95	7.20
Irvin,Pa. U5	*.6.95*	*7.20*
Kokomo,Ind. C16	*7.05*	
MartinsFry. W10	..6.65	6.90
Pittsburgh J5	....6.65	...
Pitts.,Calif. C11	...7.40	...
SparrowsPt. B2	..6.95	...

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ... 7.20

SHEETS, Galvanized Steel
Hot-Dipped

Ala.City,Ala. R2 .....6.60‡
Ashland,Ky. A10 ....6.60†
Canton,O. R2 .....6.60‡
Dover,O. R1 .....6.60†
Fairfield,Ala. T2 .....6.60†
Gary,Ind. U5 .....6.60†
*GraniteCity,Ill. G4 ....6.80**
Ind.Harbor,Ind. I-2 ..6.60†
Irvin,Pa. U5 .....6.60‡
Kokomo,Ind. C16 .....6.70‡
MartinsFerry,O. W10 .6.60‡
Middletown,O. A10 ..6.60†
Pittsburg,Calif. C11 ..7.35*
Pittsburgh J5 .....6.30†
SparrowsPt.,Md. B2 ...6.30†
Warren,O. R2 .....6.60†
*Weirton,W.Va. W6 ....6.60**

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Well Casing

Fontana,Calif. K1 .....7.275

SHEETS, Galvanized
High-Strength, Low-Alloy

Irvin,Pa. U5 .....9.725
SparrowsPt.(39) B2 ...9.725

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.00
Irvin,Pa. U5 .....7.00

SHEETS, Galvanized Ingot Iron
(Hot-Dipped Continuous)

Ashland,Ky. A10 .....6.85
Middletown,O. A10 .....6.85

SHEETS, Electrogalvanized

Cleveland(28) R2 .....7.425
Niles,O.(28) R2 .....7.425
Weirton,W.Va. W6 ....6.975

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.25
Butler,Pa. A10 (type 2) 9.35

SHEETS, Enameling Iron

Ashland,Ky. A10 ....6.625
Cleveland R2 .....6.625
Gary,Ind. U5 .....6.625
GraniteCity,Ill G4 ....6.825
Ind.Harbor,Ind. I-2,Y1 6.625
Irvin,Pa. U5 .....6.625
Middletown,O. A10 ....6.625
Niles,O. M21 .....6.625
Youngstown Y1 .....6.625

BLUED STOCK, 29 Gage

Follansbee,W.Va. F4 ....8.65
Ind.Harbor,Ind. I-2 ..8.175
Yorkville,O. W10 .....8.175

SHEETS, Long Terne Steel
(Commercial Quality)

BeechBottom,W.Va.W10 7.00
Gary,Ind. U5 .....7.00
Mansfield,O. E6 .....7.00
Middletown,O. A10 ....7.00
Niles,O. M21 .....7.00
Weirton,W.Va. W6 .....7.00

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 .....7.40

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U.S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B11 Buffalo Bolt Co., Div., Buffalo-Eclipse Corp.
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.
C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Products Dept. Wickwire Spencer Steel Division
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
D2 Detroit Steel Corp.
D3 Dearborn Division Sharon Steel Corp.
D4 Disston Division, H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.
E1 EasternGas&FuelAssoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.
F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
H1 Hanna Furnace Corp.
H7 Helical Tube Co.
I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins, E., Steel Tube
I-7 Indiana Steel & Wire Co.
J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.
K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.
L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M13 Monarch Steel Div., Jones & Laughlin Steel Corp.
M14 McInnes Steel Co.
M16 Md. Fine & Special. Wire
M17 Metal Forming Corp.
M18 Milton Steel Division, Merritt-Chapman&Scott
M21 Mallory-Sharon Titanium Corp.
M22 Mill Strip Products Co.
N1 National Standard Co.
N2 National Supply Co.
N3 National Tube Div., U.S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N14 Northwest.SteelRoll.Mill
N15 Northwestern S.&W. Co.
N19 Northeastern Steel Corp.
O4 Oregon Steel Mills
P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co., Sub. of Barium Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Division, Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.
S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Steel Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Dawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.
S40 Seneca Steel Service
S41 Stainless Steel Div., J&L Steel Corp.
T2 Tenn. Coal & Iron Div., U.S. Steel Corp.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Strip Division, Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.
U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U.S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U.S. Steel Supply Div., U.S. Steel Corp.
V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Div., H. K. Porter Co. Inc.
W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel&Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
Y1 Youngstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27)	R2	4.925
Allenport,Pa.	P7	4.675
Alton,Ill. L1		*5.125*
Ashland,Ky.(8)	A10	4.925
Atlanta	A11	4.875
Bessemer,Ala.	T2	4.925
Birmingham C15		*4.925*
Buffalo(27)	R2	4.925
Conshohocken,Pa.	A3	4.975
Detroit M1		*5.025*
Ecorse,Mich. G5		*5.025*
Fairfield,Ala.	T2	4.925
Fontana,Calif. K1		*5.775*
Gary,Ind.	U5	4.925
Houston S5		*5.175*
Ind.Harbor,Ind.	I-2, Y1	4.925
Johnstown,Pa.(25)	B2	4.925
KansasCity,Mo. S5		*5.175*
Lackaw'na,N.Y.(25)	B2	4.925
LosAngeles(25) B3		*5.675*
Minnequa,Colo. C10		*6.025*
Pittsburg,Calif.	C11	5.675
Riverdale,Ill.	A1	4.925
SanFrancisco	S7	5.95
Seattle(25) B3		*5.925*
Seattle	N14	5.675
Sharon,Pa.	S3	4.675
S.Chicago,Ill.	W14	4.925
S.SanFrancisco(25) B3		*5.675*
SparrowsPoint,Md.	B2	4.925
Sterling,Ill.(1)	N15	4.675
Sterling,Ill.	N15	4.775
Torrance,Calif.	C11	5.675
Warren,O.	R2	4.925
Weirton,W.Va. W6		*4.925*
Youngstown	U5	4.925

STRIP, Hot-Rolled Alloy

Carnegie,Pa.	S18	7.75
Gary,Ind.	U5	8.10
Houston S5		*8.35*
Ind.Harbor,Ind.	Y1	8.10
KansasCity,Mo. S5		*8.35*
LosAngeles B3		*9.30*
Newport,Ky.	A2	8.10
Sharon,Pa.	S3	7.75
S.Chicago,Ill.	W14	8.10
Youngstown	U5, Y1	8.10

STRIP, Hot-Rolled High-Strength, Low-Alloy

Bessemer,Ala.	T2	7.325
Conshohocken,Pa.	A3	7.325
Ecorse,Mich. G5		*7.425*
Fairfield,Ala.	T2	7.325
Gary,Ind.	U5	7.325
Houston S5		*7.575*
Ind.Harbor,Ind.	I-2, Y1	7.325
KansasCity,Mo. S5		*7.575*
Lackawanna,N.Y.	**B2**	**9.325**
LosAngeles(25) B3		*8.075*
Seattle(25) B3		*8.325*
Sharon,Pa.	S3	6.95
S.Chicago,Ill.	W14	7.325
S.SanFrancisco(25) B3		*8.075*
SparrowsPoint,Md.	**B2**	**9.325**
Warren,O.	R2	7.325
Weirton,W.Va. W6		*7.325*
Youngstown	U5, Y1	7.325

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	*5.175*
Warren,O. R2	*5.675*

STRIP, Cold-Rolled Carbon

Anderson,Ind.	G6	6.85
Baltimore T6		*7.15*
Boston T6		*7.70*
Buffalo S40		*7.15*
Cleveland	J5	6.85
Cleveland	A7	7.15
Conshohocken,Pa.	A3	7.20
Dearborn,Mich. D3		*7.25*
Detroit D2, M1, P20		*7.25*
Dover,O.	G6	6.85
Ecorse,Mich. G5		*7.25*
Evanston,Ill. M22		*7.25*
Follansbee,W.Va. F4		*7.15*
Fontana,Calif. K1		*9.00*
Franklin Park,Ill. T6		*7.25*
Ind.Harbor,Ind.	Y1	7.15
Indianapolis C8		*7.30*
LosAngeles C1		*9.20*
NewBedford Mass.	R10	7.30
NewBritain(10)	S15	6.85
NewCastle,Pa. B4, E5		*7.15*
NewHaven,Conn. D2		*7.60*
NewKensington,Pa.	A6	6.85
Pawtucket,R.I. R3		*7.80*
Pawtucket,R.I.	N8	7.40
Pittsburgh	J5	6.85
Riverdale,Ill.	A1	7.25
Rome,N.Y.(32)	R6	6.85
Sharon,Pa.	S3	6.85
Trenton,N.J.(31)	R5	8.30
Wallingford,Conn.	W2	7.30
Warren,O. R2, T5		*7.15*
Weirton,W.Va W6		*7.15*
Worcester,Mass.	A7	7.70
Youngstown	C8, Y1	7.15

STRIP, Cold-Rolled Alloy

Boston T6	*15.40*
Carnegie,Pa. S18	14.55
Cleveland A7	*15.25*
Dover O. G6	14.55
Franklin Park,Ill. T6	*15.05*
Harrison,N.J. C18	14.55
Indianapolis C8	14.70
Pawtucket,R.I. N8	14.90
Riverdale,Ill. A1	*15.05*
Sharon,Pa. S3	14.55
Worcester,Mass. A7	*15.55*
Youngstown C8	14.55

STRIP, Cod-Rolled High-Strength, Low-Alloy

Cleveland A7	*10.45*
Dearborn,Mich. D3	*10.60*
Dover O G6	10.10
Ecorse,Mich. G5	*10.55*
Ind.Harbor,Ind. Y1	*10.65*
Sharon,Pa. S3	10.00
Warren,O. R2	*10.45*
Weirton,W.Va. W6	*10.45*
Youngstown Y1	*10.65*

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	*9.50*	*10.70*	*12.90*	*15.90*	*18.85*
Boston T6	*9.50*	*10.70*	*12.90*	*15.90*	*18.85*
Bristol Conn. W1	....	10.40	12.60	15.60	18.55
Carnegie,Pa. S18	8.65	10.10	12.30	15.30	....
Cleveland A7	8.65	10.10	12.30	15.30	18.25
Cleveland C7	....	10.10	12.30	15.30	18.25
Dearborn,Mich. D3	*9.05*	*10.50*	*12.70*	....	....
Detroit D2	*9.05*	*10.50*	*12.70*	*15.70*	....
Dover,O. G6	8.65	10.10	12.30	15.30	18.25
Evanston,Ill. M22	*8.95*	*10.40*	*12.60*	....	....
Franklin Park,Ill. T6	*9.05*	*10.40*	*12.60*	*15.60*	*18.55*
Harrison,N.J. C18	....	....	12.60	15.60	18.55
Indianapolis C8	*9.10*	*10.55*	*12.60*	*15.60*	*18.55*
LosAngeles C1	10.85	12.30	14.50	....	....
NewBritain,Conn.(10) S15	8.65	10.10	12.30	15.30	18.25
NewCastle,Pa. B4, E5	*8.95*	*10.40*	*12.60*	*15.60*	....
NewHaven,Conn. D2	*9.40*	*10.70*	*12.90*	*15.90*	....
NewKensington,Pa. A6	8.65	10.10	12.30	15.30	....
NewYork W3	....	10.40	12.60	15.60	18.55
Pawtucket,R.I. N8	9.20	10.40	12 60	15 60	18.55
Riverdale,Ill. A1	*9.05*	*10.40*	*12.60*	*15.60*	*18.55*
Rome,N.Y.(32) R6	8.65	10 10	12.30	15.30	18.25
Sharon,Pa. S3	8.65	10.10	12.30	15.30	18.25
Trenton,N.J. R5	....	10.40	12.60	15.60	18.55
Wallingford,Conn. W2	9.10	10.40	12.60	15.60	18.45
Warren,O. T5	8.65	10 10	12 30	15 30	18 25
Worcester,Mass. A7, T6	*9.50*	*10.70*	*12.90*	*15.90*	*18.85*
Youngstown C8	*8.95*	*10.40*	*12.60*	*15.60*	*18.55*

Spring Steel (Tempered)		Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn.	W1	17.10	20.95	25.30
Buffalo	W12	17.10	....	....
Franklin Park,Ill.	T6	17.45	21.30	25.65
Harrison,N.J.	C18	17.10	20.95	25.30
New York	W3	17.10	20.95	25.30
Palmer,Mass.	W12	17.10	....	....
Trenton,N.J.	R5	17.10	20.95	25.30
Worcester,Mass.	A7, T6	17.10	20.95	25.30
Youngstown	C8	17.45	21.30	25.65

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	*7.90*

STRIP, C.R. Electrogalvanized

Cleveland A7	*7.15**
Dover,O. G6	6.85*
Evanston,Ill. M22	*7.25*
Riverdale,Ill. A1	*7.25**
Warren,O. B9, T5	*7.15**
Worcester,Mass. A7	*7.70**
Youngstown C8	6.85*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Sharon,Pa. S3	6.975

TIGHT COOPERAGE HOOP

Atlanta A11	5.40
Riverdale,Ill. A1	*5.50*
Sharon,Pa. S3	5.10
Youngstown U5	*5.35*

SILICON STEEL

H.R. SHEETS(22 Ga.,cut lengths)		Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va.	W10	....	....	11.00	12.05	13.05
Brackenridge,Pa. A4		....	....	*11.55*	*12.65*	*13.70*
Mansfield,O. E6		*9.625*	*11.10*	*11.80*	*12.90*	*13.95*
Newport,Ky.	A2	9.625	11.10	11.20	12.90	13.95
Niles,O. M21		*9.625*	*11.10*	*11.80*	*12.90*	....
Vandergrift,Pa. U5		....	*11.10*	*11.80*	*12.90*	*13.95*
Warren,O. R2		*9.625*	*11.10*	*11.80*	*12.90*	....
Zanesville,O. A10		....	*11.10*	*11.80*	*12.90*	*13.95*
Zanesville,O. A10 (FP coils)		....	*11.35*	*12.05*	*13.15*	*14.20*
Zanesville,O. A10 (SP coils)		....	....	*11.55*	*12.65*	*13.70*

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
Brackenridge,Pa. A4	....	....	*12.05*	*13.15*	*14.20*
Granite City,Ill. G4	*9.825**	*11.05**	*11.75**	*12.85**	....
Indiana Harbor,Ind. I-2	9.625†	10.85*	11.55*	12.65*	....
Mansfield,O. E6	*9.625**	*11.35*	*12.05*	*13.50*	*14.20*
Vandergrift,Pa. U5	*9.625**	*11.35*	*12.05*	*13.15*	*14.20*
Warren,O. R2	*9.625**	*11.35*	*12.05*	*13.15*	*14.20*

H.R. SHEETS (22 Ga., cut lengths)		Transformer Grades T-72	T-65	T-58	T-52
BeechBottom,W.Va.	W10	14.05	14.60	15.10	16.15
Brackenridge,Pa. A4		*14.75*	....	....	....
Vandergrift,Pa. U5		*15.00*	*15.55*	*16.05*	*17.10*
Zanesville,O. A10		*15.00*	*15.55*	*16.05*	*17.10*

C.R. COILS & CUT LENGTHS (22 Ga.)		Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4		....	*17.60*	*19.20*	*19.70*	*20.20*	....
Butler,Pa.	A10	....	....	18.50	19.00	19.50	....
Vandergrift,Pa. U5		*16.60*	*17.60*	*19.20*	*19.70*	*20.20*	*14.75***
Warren,O. R2		....	....	....	....	....	*15.25‡*
Zanesville,O. A10		....	....	*19.20*	*19.70*	*20.20*	....

*Semiprocessed. †Fully processed only. ‡Coils, annealed. semiprocessed ½c lower. **Cut lengths, ¾-cent lower.

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$8.75	$9.00	$9.40
Fairfield,Ala. T2	8.85	9.10	9.50
Fairless,Pa. U5	8.85	9.10	9.50
Fontana,Calif. K1	9.50	9.75	10.15
Gary,Ind. U5	8.75	9.00	9.40
GraniteCity,Ill. G4	8.85	9.10	9.50
IndianaHarbor,Ind. I-2, Y1	8.75	9.00	9.40
Irvin,Pa. U5	8.75	9.00	9.40
Niles,O. R2	8.75	9.00	9.40
Pittsburg,Calif. C11	9.50	9.75	10.15
SparrowsPoint,Md. B2	8.85	9.10	9.50
Weirton,W.Va. W6	8.75	9.00	9.40
Yorkville,O. W10	8.75	9.00	9.40

ELECTROTIN (22-27 Gage; Dollars per 100 lb)

Aliquippa,Pa.	J5	7.425	7.625	....
Niles,O. R2		*7.725*	*7.925*	*8.125*

TINPLATE, American 1.25 lb 1.50 lb

Aliquippa,Pa.	J5	$10.05 $10.30
Fairfield,Ala.	T2	10.15 10.40
Fairless,Pa.	U5	10.15 10.40
Fontana,Calif.	K1	10.80 11.05
Gary,Ind.	U5	10.05 10.30
Irvin,Pa.	U5	10.05 10.30
Pitts.,Calif.	C11	10.80 11.05
Sp.Pt.,Md.	B2	10.15 10.40
Weirton,W.Va.	W6	10.05 10.30
Yorkville,O.	W10	10.05 10.30

BLACK PLATE (Base Box)

Aliquippa,Pa.	J5	$7.85
Fairfield,Ala.	T2	7.95
Fairless,Pa.	U5	7.95
Fontana,Calif.	K1	8.60
Gary,Ind.	U5	7.85
GraniteCity,Ill.	G4	7.95
Ind.Harbor,Ind.	I-2, Y1	7.85
Irvin,Pa.	U5	7.85
Niles,O.	R2	7.85
Pittsburg,Calif.	C11	8.60
SparrowsPoint,Md.	B2	7.95
Weirton,W.Va.	W6	7.85
Yorkville,O.	W10	7.85

HOLLOWARE ENAMELING Black Plate (29 Gage)

Aliquippa,Pa.	J5	$7.50
Gary,Ind.	U5	7.50
GraniteCity,Ill.	G4	7.60
Ind.Harbor,Ind.	Y1	7.50
Irvin,Pa.	U5	7.50
Yorkville,O.	W10	7.50

MANUFACTURING TERNES (Special Coated, Base Box)

Gary,Ind.	U5	$9.70
Irvin,Pa.	U5	9.70

ROOFING SHORT TERNES (8 lb Coated, Base Box)

Gary,Ind.	U5	$11.25

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala.	R2	7.65
Aliquippa,Pa.	J5	7.20
Alton,Ill.	L1	7.40
Atlanta A11		*7.85*
Bartonville,Ill.	K4	7.30
Buffalo	W12	7.20
Chicago W13		*7.65*
Cleveland	C20	7.20
Cleveland	A7	7.65
Crawfordsville,Ind.	M8	7.30
Donora,Pa.	A7	7.65
Duluth	A7	7.65
Fairfield,Ala.	T2	7.65
Fostoria,O.(24)	S1	7.30
Houston S5		*7.90*
Jacksonville,Fla.	M8	7.55
Johnstown,Pa. B2		*7.65*
Joliet,Ill.	A7	7.65
KansasCity,Mo. S5		*7.90*
Kokomo,Ind. C16		*7.75*
LosAngeles B3		*8.60*
Minnequa,Colo. C10		*7.90*
Monessen,Pa.	P7, P16	7.20
N.Tonawanda,N.Y.	B11	7.20
Palmer,Mass.	W12	7.50
Pittsburg,Calif.	C11	8.60
Portsmouth,O. P12		*7.65*
Rankin,Pa.	A7	7.65
S.Chicago,Ill.	R2	7.65
S.SanFrancisco C10		*8.60*
SparrowsPoint,Md. B2		*7.75*
Sterling,Ill.(1)	N15	7.65
Sterling,Ill.	N15	7.75
Struthers,O.	Y1	7.65
Waukegan,Ill.	A7	7.65
Worcester,Mass.	A7	7.95

WIRE, Gal'd ACSR for Cores

Bartonville,Ill.	K4	11.90
Buffalo	W12	11.90
Cleveland A7		*12.65*
Donora,Pa. A7		*12.65*
Duluth A7		*12.65*
Johnstown,Pa. B2		*12.65*
Minnequa,Colo.	C10	12.025
Monessen,Pa.	P16	11.90
Muncie,Ind.	I-7	12.10
NewHaven,Conn. A7		*12.95*
Palmer,Mass.	W12	12.20
Pittsburg,Calif.	C11	12.70
Portsmouth,O.	P12	11.90
Roebling,N.J.	R5	12.20
SparrowsPt.,Md. B2		*12.75*
Struthers,O. Y1		*12.65*
Trenton,N.J. A7		*12.95*
Waukegan,Ill. A7		*12.65*
Worcester,Mass. A7		*12.95*

WIRE, Upholstery Spring

Aliquippa,Pa.	J5	8.70
Alton,Ill.	L1	8.90
Buffalo	W12	8.70
Cleveland	A7	9.30
Donora,Pa.	A7	9.30
Duluth	A7	9.30
Johnstown,Pa. B2		*9.30*
KansasCity,Mo. S5		*9.55*
LosAngeles B3		*10.25*
Minnequa,Colo. C10		*9.50*
Monessen,Pa.	P7, P16	8.70
NewHaven,Conn.	A7	9.60
Palmer,Mass.	W12	9.00
Pittsburg,Calif.	C11	10.25
Portsmouth,O. P12		*9.30*
Roebling,N.J.	R5	9.00
S.Chicago,Ill. R2		*9.30*
S.SanFrancisco C10		*10.25*
SparrowsPt.,Md. B2		*9.40*
Struthers,O. Y1		*9.30*
Trenton,N.J.	A7	9.60
Waukegan,Ill.	A7	9.30
Worcester,Mass.	A7	9.60

WIRE, MB Spring, High Carbon

Aliquippa,Pa.	J5	9.025
Alton,Ill.	L1	9.225
Bartonville,Ill.	K4	9.125
Buffalo	W12	9.025
Cleveland	A7	9.30
Donora,Pa.	A7	9.30
Duluth	A7	9.30
Fostoria,O.	S1	9.075
Johnstown,Pa. B2		*9.30*
LosAngeles B3		*10.25*
Milbury,Mass.(12)	**N6**	**9.325**
Minnequa,Colo. C10		*9.55*
Monessen,Pa.	P7, P16	9.025
Muncie,Ind.	I-7	9.225
Palmer,Mass.	W12	9.325
Pittsburg,Calif.	C11	10.25
Portsmouth,O. P12		*9.30*
Roebling,N.J.	R5	9.325
S.Chicago,Ill.	R2	9.30
S.SanFrancisco C10		*10.25*
SparrowsPt.,Md. B2		*9.40*
Struthers,O.	Y1	9.30
Trenton,N.J.	A7	9.60
Waukegan,Ill.	A7	9.30
Worcester	J4, T6, W12	9.325
Worcester,Mass.	A7	9.60

WIRE, Fine & Weaving(8" Coils)

Alton,Ill.	L1	14.65
Bartonville,Ill.	K4	14.55
Buffalo	W12	14.45
Chicago W13		*15.60*
Cleveland A7		*15.60*
Crawfordsville,Ind.	M8	14.25
Fostoria,O.	S1	14.45
Jacksonville,Fla.	M8	14.50
Johnstown,Pa. B2		*15.60*
Kokomo,Ind.	C16	14.45
Monessen,Pa.	P7	14.45
Muncie,Ind.	I-7	14.65
Palmer,Mass.	W12	14.75
Pittsburg,Calif.	C10	14.45
S.SanFrancisco	C10	14.80
Waukegan,Ill. A7		*15.60*
Worcester,Mass. A7, T6		*15.90*

ROPE WIRE

Bartonville,Ill.	K4	12.00
Buffalo	W12	12.00
Fostoria,O.	S1	12.00
Johnstown,Pa.	B2	12.00
Monessen,Pa.	P7	12.00
Muncie,Ind.	I-7	12.20
Palmer,Mass.	W12	12.30
Portsmouth,O. P12		*12.75*
Roebling,N.J.	R5	12.30
SparrowsPt.,Md.	B2	12.10
Struthers,O. Y1		*12.75*
Worcester,Mass.	J4	12.30

(A) Plow and Mild Plow; add 0.25c for Improved Plow

WIRE

WIRE, Tire Bead

Bartonville,Ill. K4	15.75
Monessen,Pa. P16	15.45
Roebling,N.J. R5	16.10

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	10.75
Baltimore T6	*11.95*
Boston T6	*11.95*
Buffalo W12	10.75
Chicago W13	*11.75*
Cleveland A7	*11.65*
Crawfordsville,Ind. MS	10.75
Dover,O. G6	10.75
Fostoria,O. S1	11.05
FranklinPark,Ill. T6	*11.75*
Kokomo,Ind. C16	10.75
Massillon,O. R8	10.75
Milwaukee C23	10.95
Monessen,Pa. P7, P16	10.75
NewKensington,Pa. A6	10.75
Palmer,Mass. W12	11.05
Pawtucket,R.I. N8	11.05
Riverdale,Ill. A1	*11.75*
Rome,N.Y. R6	10.75
Trenton,N.J. R5	11.05
Worcester,Mass. A7, T6	*11.95*

NAILS, Stock — **Col.**

AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	164
Atlanta A11	*175*
Bartonville Ill. K4	166
Chicago W13	*173*
Cleveland A9	*173*
Crawfordsville,Ind. MS	166
Donora,Pa. A7	173
Duluth A7	173
Houston,Tex. S5	*178*
Fairfield,Ala. T2	173
Jacksonville,Fla.(20) MS	175
Joliet,Ill. A7	173
Johnstown,Pa. B2	*173*
KansasCity,Mo. S5	*178*
Kokomo,Ind. C16	*175*
Minnequa,Colo. C10	*178*
Monessen,Pa. P7	164
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago Ill. R2	173
SparrowsPt.,Md. B2	*175*
Sterling,Ill.(7) N15	*175*
Worcester,Mass. A7	179

(To Wholesalers; per cwt)

Galveston,Tex. D7	*$8.95*

NAILS, Cut (100 lb keg)

To Dealers (33)

Conshohocken,Pa. A3	$9.80
Wheeling,W.Va. W10	9.80

POLISHED STAPLES — **Col.**

Atlanta A11	*177*
AlabamaCity,Ala. R2	*175*
Donora,Pa. A7	175
Duluth A7	175
Fairfield,Ala. T2	175
Joliet,Ill. A7	175
Johnstown,Pa. B2	*175*
Kokomo,Ind. C16	*175*
Minnequa,Colo. C10	*180*
Pittsburg,Calif.(45) C11	192
Rankin,Pa. A7	175
S.Chicago,Ill. R2	*175*
SparrowsPt.,Md. B2	*177*
Sterling(7) N15	*175*
Worcester,Mass. A7	181

TIE WIRE, Automatic Baler (14½ Ga.)(Per 97 lb Net Box)

Coil No. 3150

AlabamaCity,Ala. R2	*$10.26*
Atlanta A11	*10.08*
Bartonville,Ill. K4	9.63
Buffalo W12	9.82
Chicago W13	*10.26*
Crawfordsville,Ind. MS	9.63
Donora,Pa. A7	*10.26*
Duluth A7	*10.26*
Fairfield,Ala. T2	*10.26*
Houston S5	*10.51*
Jacksonville,Fla MS	10.09
Johnstown,Pa. B2	*10.26*
Joliet,Ill. A7	*10.26*
KansasCity,Mo. S5	*10.51*
Kokomo,Ind. C16	*10.36*
LosAngeles B3	*11.05*
Minnequa,Colo. C10	*10.51*
Pittsburg,Calif. C11	*11.04*
S.Chicago,Ill. R2	*10.26*
S.SanFrancisco C10	*11.04*
SparrowsPt.,Md. B2	*10.36*
Sterling,Ill.(37) N15	*10.36*

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	*$10.60*
Atlanta A11	*10.40*
Bartonville,Ill. K4	9.95
Buffalo W12	10.15
Chicago W13	*10.60*
Crawfordsville,Ind. MS	9.95
Donora,Pa. A7	*10.60*
Duluth A7	*10.60*
Fairfield,Ala. T2	*10.60*
Houston S5	*10.85*
Jacksonville,Fla. MS	10.41
Johnstown,Pa. B2	*10.60*
Joliet,Ill. A7	*10.60*
KansasCity,Mo. S5	*10.85*
Kokomo,Ind. C16	*10.70*
Los Angeles B3	*11.40*
Minnequa,Colo. C10	*10.85*
Pittsburg,Calif. C11	11.40
S.Chicago,Ill. R2	*10.60*
S.SanFrancisco C10	*11.40*
SparrowsPt.,Md. B2	*10.70*
Sterling,Ill.(37) N15	*10.70*

Coil No. 6500 Interim

AlabamaCity,Ala. R2	*$10.65*
Atlanta A11	*10.45*
Bartonville,Ill. K4	10.00
Buffalo W12	10.20
Chicago W13	*10.65*
Crawfordsville,Ind. MS	10.00
Donora,Pa. A7	*10.65*
Duluth A7	*10.65*
Fairfield,Ala. T2	*10.65*
Houston S5	*10.90*
Jacksonville,Fla. MS	10.46
Johnstown,Pa. B2	*10.65*
Joliet,Ill. A7	*10.65*
KansasCity,Mo. S5	*10.90*
Kokomo,Ind. C16	*10.75*
LosAngeles B3	*11.45*
Minnequa,Colo. C10	*10.90*
Pittsburg,Calif. C11	*11.45*
S.Chicago,Ill. R2	*10.65*
S.SanFrancisco C10	*11.45*
SparrowsPt.,Md. B2	*10.75*
Sterling,Ill.(37) N15	*10.75*

BALE TIES, Single Loop — **Col.**

AlabamaCity,Ala. R2	212
Atlanta A11	*208*
Bartonville,Ill. K4	192
Crawfordsville,Ind. MS	192
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	*217*
Jacksonville,Fla. MS	197
Joliet,Ill. A7	212
KansasCity,Mo. S5	*217*
Kokomo,Ind. C16	*214*
Minnequa,Colo. C10	*217*
Pittsburg,Calif C11	*236*
S.Chicago,Ill. R2	*212*
S.SanFrancisco C10	*236*
Sterling,Ill.(7) N15	*214*
SparrowsPt.,Md. B2	*214*
Tonawanda,N.Y. B12	169
Williamsport,Pa. S19	175

WIRE, Barbed — **Col.**

AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	181§
Atlanta A11	*199**
Bartonville,Ill. K4	190
Crawfordsville,Ind. MS	190
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston,Tex. S5	*198**
Jacksonville,Fla. MS	195
Johnstown,Pa. B2	*196§*
Joliet,Ill. A7	193†
KansasCity,Mo. S5	*198**
Kokomo,Ind. C16	*195†*
Minnequa,Colo. C10	*198**
Monessen,Pa. P7	188*
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	*193**
S.SanFrancisco C10	204**
SparrowsPoint,Md. B2	*198§*
Sterling,Ill.(7) N15	*198§*

WOVEN FENCE, 9-15 Ga. — **Col.**

Ala.City,Ala. R2	187**
Aliq'ppa,Pa. 9-14½ga. J2	179§
Atlanta A11	*193**
Bartonville,Ill. K4	182
Crawfordsville,Ind. MS	182
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston,Tex. S5	*192**
Jacksonville,Fla. MS	187
Johnstown,Pa.(43) B2	*190§*
Joliet,Ill. A7	187†
KansasCity,Mo. S5	*192**
Kokomo,Ind. C16	*189†*
Minnequa,Colo. C10	*192**
Monessen,Pa. 9 ga. P7	180*
Pittsburg,Calif. C11	210†
Rankin,Pa. A7	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	*192§*

WIRE (16 gage) — **An'ld Galv.** — **Stone**

Ala.City,Ala. R2	*17.15*	*18.70***
Aliq'ppa.Pa. J5	15.70	17.50
Bartonville K4	15.80	17.75
Cleveland A7	*17.15*	
Crawf'dsville MS	15.80	17.75
Fostoria,O. S1	16.50	18.05†
Houston S5	16.25	17.80**
Jacksonville MS	16.05	18.00
Johnstown B2	*17.15*	*18.95§*
Kan.City,Mo. S5	16.25	
Kokomo C16	*17.25*	*19.05†*
Minnequa C10	*16.25*	*17.80****
P'im'r,Mass. W12	16.30	17.85†
Pitts.,Calif. C11	16.35	17.90†
SparrowsPt. B2	*17.25*	*19.05§*
Sterling(37) N15	*17.25*	*19.05§*
Waukegan A7	*17.15*	*18.70†*
Worcester A7	*17.45*	

WIRE, Merchant Quality

(6 to 8 gage) — **An'ld Galv.**

Ala.City,Ala. R2	8.65	9.20**
Aliquippa J5	7.95	8.475§
Atlanta(48) A11	*8.50*	*9.10**
Bartonville(48) K4	8.05	8.65
Buffalo W12	8.20	8.75†
Cleveland A7	8.65	
Crawfordsville MS	8.05	8.65
Donora,Pa. A7	8.65	9.20†
Duluth A7	8.65	9.20†
Fairfield T2	8.65	9.20†
Houston(48) S5	*8.90*	*9.45****
Jacks'ville,Fla. MS	8.30	8.90
Johnstown B2(48)	*8.65*	*9.325§*
Joliet,Ill. A7	8.65	9.20†
Kans.City(48) S5	*8.90*	*9.45****
Kokomo C16	*8.75*	*9.30†*
LosAngeles B3	*9.60*	*10.25§§*
Minnequa C10	*8.90*	*9.45****
Monessen P7(48)	7.95	8.55*
Palmer,Mass. W12	8.50	9.05†
Pitts.,Calif. C11	9.60	10.15†
Rankin,Pa A7	8.65	9.20†
S.Chicago R2	8.65	9.20**
S.SanFran. C10	*9.60*	*10.15*****
Spar'wsPt. B2(48)	*8.75*	*9.425§*
Sterling(48) N15	*8.90*	*9.575§*
Sterling(1)(48)	*8.80*	*9.475§*
Struth'rs,O.(48)Y1	*8.65*	*9.30‡*
Worcester,Mass.A7	8.95	9.50†

Based on zinc price of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. **Subject to zinc equalization extras.

FASTENERS

(Base discounts, full container quantity, per cent off list, f.o.b. mill)

BOLTS

Carriage, Machine Bolts

Full Size Body (cut thread)

½ in. and smaller:

6 in. and shorter	52.5
Longer than 6 in.	43
⅝ in. thru 1 in.:	
6 in. and shorter	43.5
Longer than 6 in.	41.5
1⅛ in. and larger:	
All lengths	41.5

Undersized Body (rolled thread)

½ in. and smaller:

6 in. and shorter	52.5

Carriage, Machine, Lag Bolts

Hot Galvanized:

½ in. and smaller:

6 in. and shorter	32.0
Longer than 6 in.	19.0
⅝ in. thru 1 in.:	
6 in. and shorter	16.0
Longer than 6 in.	16.0
1⅛ in. and larger:	
All lengths	16.0

Lag Bolts

All diameters:

6 in. and shorter	52.5
Longer than 6 in.	44.5

Plow and Tap Bolts

½ in. and smaller by 6 in. and shorter — 52.0

Larger than ½ in. or longer than 6 in. — 44.5

Blank Bolts — 44.5

Step, Elevator, Tire Bolts — 52.0

Stove Bolts, Slotted

⅛ to ¼-in. incl., 3 in. and shorter	54.00
9/32 to ½-in., inclusive	54.00

NUTS

Reg. & Heavy Square Nuts:

All sizes — 58.0

Square Nuts, Reg. & Heavy, Hot Galvanized:

All sizes — 44.0

Hex Nuts, Reg. & Heavy, Hot Pressed:

¾ in. and smaller	61.5
⅞ in. to 1 in., incl.	57.5
1⅛ in. to 1½ in., incl.	62.5
1⅝ in. and larger	56.0

Hex Nuts, Reg. & Heavy, Cold Punched:

¾ in. and smaller	61.5
⅞ in. to 1½ in., incl.	57.5
1⅝ in. and larger	56.0

Hex Nuts, All Types, Hot Galvanized:

¾ in. and smaller	48.0
⅞ in. to 1 in., incl.	44.0
1⅛ in. to 1½ in., incl.	49.0

Hex Nuts, Semifinished, Heavy (Incl. Slotted):

¾ in. and smaller	61.5
⅞ in. to 1⅛ in., incl.	57.5
1⅝ in. and larger	56.0

Hex Nuts, Finished (Incl. Slotted and Castellated):

1 in. and smaller	64.00
1⅛ in. to 1½ in., incl.	60.5
1⅝ in. and larger	56.0

Semifinished Hex Nuts, Reg. (Including Slotted):

⅝ in. and smaller	61.5
¾ in. to 1-in., incl.	64.0
1⅛ in. to 1½ in., incl.	60.5
1⅝ in. and larger	56.0

CAP AND SETSCREWS

(Base discounts, packages, per cent off list, f.o.b. mill)

Hex Head Capscrews, Coarse or Fine Thread, Bright:

6 in. and shorter:

⅝ in. and smaller	44.0
¾, ⅞ and 1 in. diam.	27.0
Longer than 6 in.:	
⅝ in. and smaller	14.0
¾, ⅞ and 1 in. diam.	0.5

High Carbon, Heat Treated:

6 in. and shorter:

⅝ in. and smaller	31.0
¾, ⅞ and 1 in. diam.	9.0

Longer than 6 in.:

⅝ in. and smaller	+6
¾, ⅞ and 1 in. diam.	+24

Flat Head Capscrews:

¾ in. and smaller — +65.0

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam.:

6 in. and shorter	11
Longer than 6 in.	+10

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½-in., larger 12.25

1/16-in. under List less 19%

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	25.98	23.54
1¼	13	....	30.78	23.36
1½	13	29.03	34.01	25.83
1¾	13	34.29	40.18	30.51
2	13	38.44	45.05	34.20
2¼	13	43.29	50.75	38.52
2¼	12	46.99	55.06	41.81
2½	12	51.76	60.65	46.05
2¾	12	56.04	65.67	49.88
3	12	59.76	70.03	53.19

RAILWAY MATERIALS

	Standard No. 1	Standard No. 2	Tee Rails All No. 2	Tee Rails 60 lb Under
RAILS				
Bessemer,Pa. U5	5.525	5.425	5.475	6.50
Ensley,Ala. T2	5.525	5.425	....	6.50
Fairfield,Ala. T2	....	....	....	6.50
Huntington,W.Va. C15	....	....	....	*6.50*
Gary,Ind. U5	5.525	5.425	5.475	....
IndianaHarbor,Ind. I-2	5.525	5.425	5.475	....
Johnstown,Pa. B2	....	....	....(16)	6.50
Lackawanna,N.Y. B2	5.525	5.425	....	6.50
Minnequa,Colo. C10	*5.525*	*5.425*	....	*7.00*
Steelton,Pa. B2	5.525	5.425	....	....
Williamsport,Pa. S19	....	....	....	6.15
TIE PLATES				
Fairfield,Ala. T2	6.60			
Gary,Ind. U5	6.60			
Ind.Harbor,Ind. I-2	6.60			
Lackawanna,N.Y. B2	6.60			
Minnequa,Colo. C10	*6.60*			
Seattle B3	*6.75*			
Steelton,Pa. B2	6.60			
Torrance,Calif. C11	6.75			
JOINT BARS				
Bessemer,Pa. U5	6.975			
Fairfield,Ala. T2	6.975			
Ind.Harbor,Ind. I-2	6.975			
Joliet,Ill. U5	6.975			
Lackawanna,N.Y. B2	6.975			
Minnequa,Colo. C10	*6.975*			
Steelton,Pa. B2	6.975			
AXLES				
Ind.Harbor,Ind. S13	*8.775*			
Johnstown,Pa. B2	8.775			

TRACK BOLTS, Untreated	
Cleveland R2	*14.75*
KansasCity,Mo. S5	13.85
Lebanon,Pa. B2	13.85
Minnequa,Colo. C10	*13.10*
Pittsburgh P14	13.10
Seattle B3	14.35
SCREW SPIKES	
Lebanon,Pa. B2	13.60
Pittsburgh P14	12.85
STANDARD TRACK SPIKES	
Fairfield,Ala. T2	9.75
Ind.Harbor,Ind. I-2, Y1	9.75
KansasCity,Mo. S5	*9.75*
Lebanon,Pa. B2	9.75
Minnequa,Colo. C10	*9.75*
Pittsburgh J5	9.225
Seattle B3	*10.25*
S.Chicago,Ill. R2	9.75
Struthers,O. Y1	9.75
Youngstown R2	9.75

Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in; 6.23c; 1 15/16 to 8 in.; inclusive, 6.60c.
(6) Chicago or Birm. base.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass., base.
(13) Add 0.25c for 17 Ga & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) 3/8"and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) Plus 1c per 100 lb.
(21) New Haven, Conn. base.
(22) Deld. San Francisco Bay area.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Delivered in mill zone, 6.045c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill add 0.50c.
(31) Widths over ⅝-in.; 7.30c, for widths ⅝-in and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 14 Ga. & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. in mill zone or within switching limits, 5.685c.
(43) 9-14½ Ga.
(44) To fabricators.
(45) Galvanized
(48) 6-7 Ga.
(49) 3½-in. and smaller rounds; 8.65c, over 3½-in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+5.25	+20.25	1.25	+15.5	3.75	+13	5.25	+11.5	5.25	+11.5	5	+11.75	7.5	+9.25
Ambridge, Pa. N2	+5.25	....	1.25	....	3.75	....	5.25	....	5.25	....	5	....	7.5	....
Lorain, O. N3	+9.25	+24.25	+2.75	+19.5	+0.25	+17	1.25	+15.5	1.25	+15.5	1	+15.75	3.5	+13.25
Youngstown Y1	+9.25	+24.25	+2.75	+19.5	+0.25	+17	1.25	+15.5	1.25	+15.5	1	+15.75	3.5	+13.25

ELECTRIC WELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+9.25	+24.25	+2.75	+19.5	+0.25	+17	1.25	+15.5	1.25	+15.5	1	+15.75	3.5	+13.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	9.25	+6	12.25	+2	15.75	2.5	18.25	3.25
Alton, Ill. L1	....	....	....	....	....	....	*3.25*	*+12*	*6.25*	*+8*	*9.15*	*+3.5*	*12.25*	*+2.75*
Benwood, W. Va. W10	6.5	+20	+4.75	+28.25	+14.75	+36.25	5.25	+10	8.25	+6	11.75	+15	14.25	+0.75
Butler, Pa. F6	7.5	+19	+3	+26.5	+12.5	+34	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	9.25	+6	12.25	+2	15.75	2.5	18.25	3.25
Fairless, Pa. N3	....	....	....	....	....	....	3.25	+12	6.25	+8	9.75	+3.5	12.25	+2.75
Fontana, Calif. K1	....	....	....	....	....	....	*+0.75*	*+23.5*	*+5.25*	*+19.5*	*+1.75*	*+15*	*0.75*	*+14.25*
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	4.25	+11	7.25	+7	10.75	+2.5	13.25	+3.25
Lorain, O. N3	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Sharon, Pa. S4	6.5	+20	+4	+27.5	+13.5	+35	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	9.25	+6	12.25	+2	15.75	2.5	18.25	3.25
Sparrows Pt., Md. B2	5.5	+21	+0.5	+28.5	+14.5	+36	7.25	+8	10.25	+4	13.75	0.5	16.25	1.25
Wheatland, Pa. W9	7.75	+19	+3	+26.5	+12.5	+34	9.25	+6	12.25	+2	15.75	2.5	18.25	3.25
Youngstown R2, Y1	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.73		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	18.75	4.25	19.25	4.75	20.75	4.5	20.75	4.5	....	....	....	....
Alton, Ill. L1	*12.95*	*+1.75*	*13.25*	*+1.25*	*14.75*	*+1.5*	*14.75*	*+1.5*	....	....	....	....
Benwood, W. Va. W10	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	6.25	+10.5	6.25	+10.5
Etna, Pa. N2	18.75	4.25	19.25	4.75	20.75	4.5	20.75	4.5	10.25	+6.5	10.25	+6.5
Fairless, Pa. N3	12.75	+1.75	13.25	+1.25	14.75	+1.5	14.75	+1.5	4.25	+12.5	4.25	+12.5
Fontana, Calif. K1	*1.25*	*+13.25*	*1.75*	*+12.75*	*3.25*	*+13*	*3.25*	*+13*	*+7.25*	*+24*	*+7.25*	*+24*
Indiana Harbor, Ind. Y1	13.75	+0.75	14.25	+0.25	15.75	+0.5	15.25	+0.5	5.25	+11.5	5.25	+11.5
Lorain, O. N3	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	....	....	....	....
Sharon, Pa. M6	18.75	4.25	19.25	4.75	20.75	4.5	20.75	4.5	....	....	....	....
Sparrows Pt., Md. B2	16.75	2.25	17.25	3.75	18.75	2.5	18.75	2.5	8.25	+8.5	8.25	+8.5
Wheatland, Pa. W9	18.75	4.25	19.25	4.75	20.75	4.5	20.75	4.5	10.25	+6.5	10.25	+6.5
Youngstown R2, Y1	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	6.25	+10.5	6.25	+10.5

*Galvanized pipe discounts based on current price of zinc (10.50c, East St. Louis).

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	Wire Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.00	27.00	....	36.00	....	42.00	44.25	48.50	45.00
202	23.75	26.25	36.50	39.00	40.75	43.00	45.00	49.25	49.25
301	23.25	28.00	....	37.25	42.00	44.25	46.25	51.25	47.50
302	25.25	31.50	38.00	40.50	42.75	45.00	47.25	52.00	52.00
302B	25.50	32.75	40.75	45.75	45.00	47.25	49.50	57.00	57.00
303	....	32.00	41.00	....	45.75	48.00	....	....	....
304	27.00	33.25	40.50	44.25	45.50	47.75	50.75	55.50	55.50
304L	....	....	48.25	51.50	53.25	55.50	58.50	63.25	63.25
305	28.50	36.75	....	47.50	45.50	47.75	51.25	58.75	58.75
308	30.75	38.25	47.25	50.25	52.75	55.75	60.25	63.00	63.00
309	39.75	49.50	57.75	64.50	63.75	67.00	71.00	80.50	80.50
310	49.75	61.50	78.00	84.25	86.50	91.00	92.75	96.75	96.75
314	....	....	....	....	86.50	....	92.75	....	....
316	39.75	49.50	62.25	69.25	69.50	73.00	76.75	81.50	81.50
316L	....	....	70.00	76.50	77.25	80.75	84.50	89.25	89.25
317	48.00	60.00	76.75	88.25	86.25	90.75	93.50	101.00	101.00
321	32.25	40.00	47.00	53.50	52.50	55.50	59.75	65.50	65.50
18-8 CbTa	37.00	46.50	55.75	63.50	61.50	64.75	69.75	79.25	79.25
403	....	....	32.00	....	36.00	37.75	40.25	....	48.25
405	19.50	25.50	29.75	36.00	33.75	35.25	37.50	46.75	46.75
410	16.75	21.50	28.25	31.00	32.25	33.75	35.00	40.25	40.25
416	....	....	28.75	....	32.75	34.25	....	....	....
420	....	33.50	34.25	41.75	39.25	41.25	45.25	62.00	62.00
430	17.00	21.75	28.75	32.00	32.75	34.25	36.00	40.75	40.75
430F	....	....	29.50	....	33.25	34.75	....	....	....
431	....	28.75	37.75	....	42.00	44.25	46.00	....	....
446	....	....	39.25	59.00	44.25	46.50	47.75	70.00	70.00

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; Alloy Metal Wire Div., H. K. Porter Co. Inc.; Alloy Tube Div., Carpenter Steel Co.; American Steel & Wire Div., U.S. Steel Corp.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; G. O. Carlson Inc.; Charter Wire Products Co.; Cold Metal Products Co.; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Elwood Ivins Steel Tube Works Inc.; Firth Sterling Inc.; Ft. Wayne Metals Inc.; Globe Steel Tubes Co.; Helical Tube Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Joslyn Mfg. & Supply Co.; Kenmore Metals Corp.; Maryland Fine & Specialty Wire Co.; McInnes Steel Co.; McLouth Steel Corp.; Metal Forming Corp.; National-Standard Co.; National Tube Div., U.S. Steel Corp.; Newman-Crosby Steel Co.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Rodney Metals Inc.; Rome Mfg. Co.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Spencer Wire Corp.; Stainless Welded Products Inc.; Standard Tube Co.; Stainless Steel Div., Jones & Laughlin Steel Corp.; Superior Steel Corp.; Superior Tube Co.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co.; Tube Methods Inc.; Ulbrich Stainless Steels; United States Steel Corp.; Universal-Cyclops Steel Co.; Wallingford Steel Co.; Washington Steel Corp.

Clad Steel

Stainless	Plates—Carbon Base 5%	10%	15%	20%	Sheets Carbon Base 20%
302	....	....	....	....	35.50
304	33.15	36.20	40.30	46.70	37.75
304-L	35.40	38.80	43.15	49.85	....
316	38.35	41.60	45.90	54.50	55.50
316-L	43.55	47.60	52.70	60.10	....
316-Cb	43.85	48.10	53.40	61.10	....
321	34.90	37.95	42.10	49.30	44.75
347	37.05	41.25	46.45	52.80	54.25
405	27.55	29.20	33.15	36.85	....
410	27.00	28.70	32.65	36.70	....
430	27.00	28.70	32.65	37.25	....
Inconel	47.28	57.90	68.50	79.20	....
Nickel	40.00	50.30	60.65	71.05	....
Nickel, Low Carbon	40.30	50.95	61.65	72.50	....
Monel	41.70	51.90	62.15	72.40	....
Copper*	....	....	....	....	46.00

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	33.00	39.85

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Regular Carbon	0.290	Cr Hot Work	0.45-0.495
Extra Carbon	0.345	W-Cr Hot Work	0.43-0.475
Special Carbon	0.41-0.45	V-Cr Hot Work	0.460
Oil Hardening	0.450	Hi-Carbon-Cr	0.830

Grade by Analysis (%) W	Cr	V	Co	Mo		$ per lb
20.25	4.25	1.6	12.25	....	....	4.170
18.25	4.25	1	4.75	....	....	2.385
18	4	2	9	....	....	2.755
18	4	2	....	....	....	1.845
18	4	1	....	....	....	1.680
9	3.5	..	....	....	....	1.275
13.5	4	3	....	....	....	1.945
13.75	3.75	2	5	....	....	2.325
6.4	4.5	1.9	....	5	....	1.185
6	4	3	....	6	....	1.430
1.5	4	1	....	8.5	....	1.040

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal tax.

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham District				
AlabamaCity,Ala. R2	58.50	59.00	....	....
Birmingham R2	58.50	59.00‡	....	....
Birmingham U6	....	62.50‡	66.50	....
Woodward,Ala. W15	*62.00***	*62.50‡*	*66.50*	....
Cincinnati, deld.	....	66.70	....	....
Buffalo District				
Buffalo H1, R2	64.50	65.00	65.50	66.00
Tonawanda,N.Y. W12	64.50	65.00	65.50	66.00
N.Tonawanda,N.Y. T9	....	65.00	65.50	66.00
Boston, deld.	75.79	76.29	76.79	....
Rochester,N.Y., deld.	67.52	68.02	68.52	....
Syracuse,N.Y., deld.	68.62	69.12	69.62	....
Chicago District				
Chicago I-3	64.50	65.00	65.00	65.50
S.Chicago,Ill. R2	64.50	....	65.00	....
S.Chicago,Ill. W14	64.50	....	65.00	65.50
Milwaukee, deld.	66.96	67.46	67.46	67.96
Muskegon,Mich., deld.	....	78.83	78.83	....
Cleveland District				
Cleveland R2, A7	64.50	65.00	65.00	65.50
Akron,O., deld.	67.62	68.12	68.12	68.62
Mid-Atlantic District				
Birdsboro,Pa. B10	66.50	67.00	67.50	68.00
Chester,Pa. P4	66.50	67.00	67.50	....
Swedeland,Pa. A3	66.50	67.00	67.50	68.00
New York, deld.	....	73.20	73.70	....
Newark,N.J., deld.	70.52	71.02	71.52	72.02
Philadelphia, deld.	68.38	68.88	69.38	69.88
Troy,N.Y. R2	66.50	67.00	67.50	68.00
Pittsburgh District				
NevilleIsland, Pa. P6	64.50	65.00	65.00	65.50
Pittsburgh (N&S sides), Aliquippa, deld.	....	66.45	66.45	66.98
McKeesRocks,Pa., deld.	....	66.10	66.10	66.63
Lawrenceville, Homestead, Wilmerding,Monaca,Pa., deld.	....	66.76	66.76	67.29
Verona,Trafford,Pa., deld.	66.79	67.32	67.32	67.85
Brackenridge,Pa., deld.	67.10	67.60	67.60	68.13
Midland,Pa. C18	64.50	....	....	....

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Youngstown District				
Hubbard,O. Y1	....	....	65.00	....
Sharpsville,Pa. S6	64.50	....	65.00	65.50
Youngstown Y1	....	....	65.00	65.50
Mansfield,O., deld.	69.40	....	69.90	70.40
Duluth I-3	64.50	65.00	65.00	65.50
Erie,Pa. I-3	64.50	65.00	65.00	65.50
Everett, Mass. E1	66.50	67.00	67.50	....
Fontana,Calif. K1	72.50	73.00	....	....
Geneva,Utah C11	64.50	65.00	....	....
GraniteCity,Ill. G4	66.40	66.90	67.40	....
Ironton,Utah C11	64.50	65.00	....	....
Minnequa,Colo. C10	66.50	67.00	67.50	....
Rockwood,Tenn. T3	....	*62.50‡*	*66.50*	....
Toledo,O. I-3	64.50	65.00	65.00	65.50
Cincinnati, deld.	71.04	71.54	....	....

**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $59.50.
‡Phos. 0.70-0.90%; Phos. 0.30-0.69%, $60.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, inclusive, add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1 for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Jackson,O. I-3, J1	77.25
Buffalo H1	78.50

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

CalvertCity,Ky. P15	$99.00
NiagaraFalls,N.Y. P15	99.00
Keokuk,Iowa Open-hearth & Fdry, $9 freight allowed K2	103.50
Keokuk,Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, max fr'gt allowed up to $9, K2	106.50

LOW PHOSPHORUS PIG IRON, Gross Ton

Lyles,Tenn. T3 (Phos. 0.035% max)	$78.50
Rockwood,Tenn. T3 (Phos. 0.035% max)	78.50
Troy,N.Y. R2 (Phos. 0.035% max)	72.50
Philadelphia, deld.	80.26
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	69.50
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	69.50
Erie,Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	69.50
NevilleIsland,Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	69.50

Warehouse Steel Products

Representative prices, per pound, subject to extras, f.o.b. warehouse. City delivery charges are 15 cents per 100 lb except: Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, Spokane, San Francisco, 10 cents; Atlanta, Houston, Seattle no charge.

	SHEETS			STRIP	BARS			Standard Structural Shapes	PLATES	
	Hot-Rolled	Cold-Rolled	Gal. 10 Ga.†	Stainless Type 302	Hot-Rolled*	H.R. Rounds	C.F. Rds‡	H.R. Alloy 4140††§		Carbon	Floor
Atlanta	8.17‖	9.37‖	9.83‖	....	8.21	8.45	10.23	....	8.59	8.55	10.51
Baltimore	7.88	8.98	9.31	....	8.36	8.53	9.13[3]	14.68	8.75	8.26	9.76
Birmingham	7.80	9.00	9.52	....	7.82	8.07	10.12	....	8.20	8.16	10.31
Boston	8.84	9.88	9.24	60.42	8.89	9.07	....	14.69	9.10	9.18	10.68
Buffalo	7.85	9.00	10.68	....	8.05	8.25	8.70	14.50	8.50	8.50	10.05
Chattanooga	7.99	9.24	9.10	....	8.00	8.24	10.04	....	8.44	8.40	10.26
Chicago	7.78	9.00	9.65	53.25	7.82	8.07	8.35	14.15	8.20	8.16	9.49
Cincinnati	7.94	9.05	9.65	50.00	8.14	8.38	8.84	14.46	8.74	8.52	9.78
Cleveland	7.78	8.98	9.55	53.43	7.92	8.16	8.60	14.24	8.57	8.39	9.72
Denver	9.70	11.30	12.49	....	9.80	9.95	10.65	18.89	9.80	9.70	11.40
Detroit	8.03	9.25	10.00	59.50	8.17	8.37	8.70	14.41	8.74	8.51	9.74
Erie, Pa.	8.20	9.45	9.95[10]	....	8.50	8.75	9.05[10]	....	9.00	8.85	10.10
Houston	8.80	9.75	10.99	....	7.75	8.05	10.65	15.00	8.00	8.80	10.30
Jackson, Miss.	8.09	9.34	9.79	....	8.16	8.41	10.23	....	8.54	8.50	10.34
Los Angeles	9.10	10.30	11.25	57.45	9.15	9.20	12.10	15.50	9.15	9.65	11.80
Milwaukee	7.93	9.13	9.93	....	7.95	8.20	8.58	14.28	8.41	8.29	9.62
Moline, Ill.	8.13	9.35	10.05	....	8.17	8.42	8.70	....	8.55	8.51	...
New York	8.97	10.23	10.56	....	9.42	9.67	....	15.09	9.45	9.53	10.81
Norfolk, Va.	8.05	...	....	....	8.55	8.60	10.80	....	8.95	8.45	9.95
Philadelphia	8.15	9.07	10.24	50.69	8.82	8.71	9.31	14.51	8.70	8.68	9.70
Pittsburgh	8.18	9.45	10.35	50.00	8.33	8.60	9.05	14.15	8.64	8.56	9.88
Portland, Oreg.	9.20	11.20	11.55	55.20	11.05‡‡	9.35	13.80	14.60	9.35	9.00	12.20
Richmond, Va.	8.00	...	10.14	....	8.55	8.40	10.00	....	8.95	8.40	9.90
St. Louis	8.14	9.34	10.16	73.36	8.19	8.43	8.96	14.51	8.67	8.52	9.86
St. Paul	8.39	9.59	10.26	....	8.43	8.68	9.21	....	8.94	8.90	10.10
San Francisco	9.05	10.40	10.65	53.45	9.05	9.15	12.55	15.60	9.15	9.30	11.55
Seattle	9.55	10.70	11.65	55.20	9.55	9.50	13.40	15.85	9.35	9.39	11.70
Spokane, Wash.	9.55	10.70	11.55	....	9.55	9.50	13.40	16.60	9.35	9.30	11.70
Washington	8.48	9.58	....	....	9.06	9.13	9.73	....	9.35	8.86	10.36

*Prices do not include gage extras; †prices include gage and coating extras (based on 12.50c zinc at Los Angeles and 10.00c at other points), except in Birmingham (coating extra excluded); ‡includes 35-cent bar quality extras; §42 in. and under; **½-in. and heavier; ††as annealed; ‡‡over 4 in.; §§over 3 in.

Base quantities, 2000 to 4999 lb except as noted; cold-rolled strip and cold-finished bars, 2000 lb and over except in Seattle; 2000 to 9999 lb, and in Los Angeles, 6000 lb and over; stainless sheets, 8000 lb except in Chicago, New York and Boston, 10,000 lb and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb; [3]—400 to 999 lb; [5]—1000 to 1999 lb; [8]—2000 to 3999 lb; [10]—2000 lb and over.

Refractories

Fire Clay Brick (per 1000)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, O., Ottawa, Ill., Stevens Pottery, Ga., $135; Salina, Pa., $140; Niles, O., $138; Cutler, Utah, $165.

Super-Duty: Ironton, O., Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Pa., New Savage, Md., St. Louis, $175; Stevens Pottery, Ga., $185; Cutler, Utah, $233.

Silica Brick (per 1000)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, O., Hawstone, Pa., $150; Warren, Niles, Windham, O., Hays, Latrobe, Morrisville, Pa., $155; E. Chicago, Ind., Joliet, Rockdale, Ill., $160; Lehigh, Utah, $175; Los Angeles, $180.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, O., Leslie, Md., Athens, Tex., $157; Morrisville, Hays, Latrobe, Pa., $160; E. Chicago, Ind., $167; Curtner, Calif., $182.

Semisilica Brick (per 1000)

Clearfield, Pa., $140; Philadelphia, $137; Woodbridge, N.J., $135.

Ladle Brick (per 1000)

Dry Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, O., $96.75; Clearfield, Pa., Portsmouth, O., $102.

High-Alumina Brick (per 1000)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $235; Danville, Ill., $238; Philadelphia, Clearfield, Pa., $230; Orviston, Pa., $245.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $295; Danville, Ill., $298; Philadelphia, Clearfield, Orviston, Pa., $305.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $335; Danville, Ill., $338; Philadelphia, Clearfield, Orviston, Pa., $345.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $188.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned, bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Nario, O., $16; Thornton, McCook, Ill., $16.35; Dolly Siding, Bonne Terre, Mo., $15.

Magnesite (per net ton)

Domestic, dead-burned, bulk ½-in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅜-in. grains with fines: Baltimore, $73.

Fluorspar

Metallurgical grades, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net tons, f.o.b. cars point of entry duty paid, metallurgical grade: European, $33-$34; Mexican, all-rail, duty paid, $25.25-$25.75; barge, Brownsville, Tex., $27.25-$27.75.

Metal Powder

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

	Cents
Sponge Iron, Swedish: Deld. east of Mississippi river, ocean bags 23,000 lb and over..	10.50
F.o.b. Riverton or Camden, N.J., west of Mississippi river..	9.50
Sponge Iron, domestic, 98 + % Fe: Deld. east of Mississippi river, 23,000 lb and over	10.50
F.o.b. Riverton, N.J., west of Mississippi river	9.50
Sponge Iron, Canadian: F.o.b. shipping point	9.50
Electrolytic Iron: Melting stock, 99.9% Fe, irregular fragments of ⅛ in. x 1.3 in.	28.00
Annealed, 99.5% Fe..	36.50
Unannealed (99+ % Fe)	36.00
Unannealed (99+ % Fe) (minus 325 mesh)	59.00
Powder Flakes (minus 16, plus 100 mesh)..	29.00
Carbonyl Iron: 98.1-99.9%, 3 to 20 microns, depending on grade, 93.00-290.00 in standard 200-lb containers; all minus 200 mesh.	

	Cents
Aluminum: Atomized, 500 lb drum, fr'ght allowed Carlots	38.20
Ton lots	40.20
Antimony, 500 lb lots.	32.00*
Brass, 5000-lb lots	32.60-39.40†
Bronze, 5000-lb lots	50.20-54.70†
Copper: Electrolytic	14.25*
Reduced	14.25*
Lead	7.50*
Manganese: Minus 35 mesh ...	64.00
Minus 100 mesh ...	70.00
Minus 200 mesh ...	75.00
Nickel, unannealed ...	$1.15
Nickel-Silver, 5000-lb lots	50.80-55.40†
Phosphor-Copper, 5000-lb lots	62.00
Copper (atomized) 5000-lb lots	44.50-52.00‡
Silicon	47.50
Solder	7.00*
Stainless Steel, 304 ..	$1.08
Stainless Steel, 316 ..	$1.44
Tin	14.50*
Zinc, 5000-lb lots	18.00-31.20‡

Tungsten:	Dollars
Melting grade, 99% 60 to 2000 mesh:	
1000 lb and over ...	3.75
Less than 1000 lb ..	3.90
Chromium, electrolytic 99.8% Cr min metallic basis	5.00

*Plus cost of metal. †Depending on composition. ‡Depending on mesh.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

Inches Diam.	Inches Length	Per 100 lb
2	24	$57.75
2½	30	37.25
3	40	35.25
4	40	33.25
5½	40	33.00
6	60	30.00
7	60	26.75
8, 9, 10	60	26.50
12	72	25.50
14	60	25.50
16	72	24.50
17	60	25.50
18	72	24.50
20	72	24.00
24	84	24.75

CARBON

8	60	13.30
10	60	13.00
12	60	12.95
14	60	12.85
14	72	11.95
17	60	11.85
17	72	11.40
20	84	11.40
20	90	11.00
24	72, 84	11.25
24	96	10.95
30	84	11.05
40, 35	110	10.70
40	100	10.70

Imported Steel

(Base per 100 lb, landed, duty paid, based on current ocean rates. Any increase in these rates is for buyer's account. Source of shipment: Western continental European countries)

	North Atlantic	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305...	$7.13	$7.13	$7.13	$7.36
Bar Size Angles	6.57	6.52	6.52	6.75
Structural Angles	6.57	6.52	6.52	6.75
I-Beams	6.82	6.77	6.77	7.00
Channels	6.82	6.77	6.77	7.00
Plates (basic bessemer)	9.00	9.00	9.00	9.30
Sheets, H.R.	8.55	8.55	8.55	8.85
Sheets, C.R. (drawing quality)	8.95	8.95	8.95	9.35
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	26.62	26.62	26.62	27.77
Barbed Wire (†)	6.95	6.95	6.95	7.40
Merchant Bars	6.95	6.95	6.95	7.30
Hot-Rolled Bands	7.15	7.15	7.15	7.55
Wire Rods, Thomas Commercial No. 5	6.38	6.38	6.38	6.78
Wire Rods, O.H. Cold Heading Quality No. 5.	6.72	6.72	6.72	7.12
Bright Common Wire Nails (‡)	8.38	8.38	8.38	8.58

†Per 82-lb. net, reel. ‡Per 100-lb kegs, 20d nails and heavier.

Ores

Lake Superior Iron Ore

(Prices effective for the 1957 shipping season, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Mesabi nonbessemer	11.45
Old range bessemer	11.85
Old range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 30, 1957, and increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

New Jersey, foundry and basic 62-64% concentrates	25.00-27.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 65%	27.00-27.50
N. African hematite (spot)	nom.
Brazilian iron ore, 68-69%	32.00-33.00

Tungsten Ore

Net ton unit, before duty

Foreign wolframite, good commercial quality	20.00-23.00
Domestic, concentrates mine	55.00

Manganese Ore

Mn 46-48%, Indian (export tax included), $1.60-1.70 per long ton unit, c.i.f. U.S. ports, duty for buyer's account: other than Indian, $1.45-1.50; contracts by negotiation.

Chrome Ore

Gross ton f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$55.00-58.00
48% 2.8:1	52.00-55.00
48% no ratio	46.00-48.00

South African Transvaal

48% no ratio	$40.00-41.00
44% no ratio	30.00-31.00

Turkish

48% 3:1	$59.00-62.00

Domestic

Rail nearest seller

18% 3:1	$39.00

Molybdenum

Sulphide concentrate, per lb of Mo content, mines, unpacked	$1.18

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$3.10-3.60
60-65%	3.60-3.80

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, furnace	$14.75-15.75
Connellsville, foundry	17.50-18.50

Oven Foundry Coke

Birmingham, ovens	$28.85
Cincinnati, deld.	33.78
Buffalo, ovens	30.50
Camden, N. J., ovens	29.50
Detroit, ovens	30.50
Pontiac, deld.	32.25
Saginaw, deld.	33.83
Erie, Pa., ovens	30.50
Everett, Mass., ovens New England, deld.	31.55*
Indianapolis, ovens	29.75
Ironton, O., ovens	29.00
Cincinnati, deld.	29.27
Kearny, N.J., ovens	29.75
Milwaukee, ovens	30.50
Painesville,O., ovens	30.50
Cleveland, deld.	32.69
Philadelphia, ovens	29.50
St. Louis, ovens	31.50
Neville Island (Pittsburgh), Pa., ovens.	29.25
St. Paul, ovens	29.75
Chicago, deld.	33 24
Swedeland, Pa., ovens	29.50
Terre Haute, Ind., ovens	29.75

*Or within $4.80 freight zone from works.

Coal Chemicals

Spot, cents per gallon, ovens

Pure benzene	36.00
Toluene, one deg.	32.00-34.00
Industrial xylene	32.00-35.00

Per ton, bulk, ovens

Ammonium sulfate	$32.00

Cents per pound, producing point

Phenol: Grade 1, 15.00; Grade 2-3, 14.50; Grade 4, 16.50; Grade 5, 15.25.

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, per gross ton, Palmerton, Pa. 21-23% Mn, $105; 19-21% Mn, 1-3% Si, $102.50; 16-19% Mn, $100.50.

Standard Ferromanganese: (Mn 74-76%, C 7% approx). Base price per net ton: $255, Johnstown, Duquesne, Sheridan, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74% respectively.

(Mn 79-81%). Lump $263 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-90%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 1.5c for max 0.15% C grade from above prices, 3c for max 0.03% C, 3.5c for max 0.50% C, and 6.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 25.5c per lb of contained Mn, packed, carload 26.8c, ton lot 28.4c, less ton 29.6c. Delivered. Spot, add 0.25c.

Manganese Metal: 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2% max). Carload, lump, bulk, 45c per lb of metal; packed, 45.75c; ton lot 47.25c; less ton lot 49.25c. Delivered. Spot, add 2c.

Electrolytic Manganese Metal: Min carload, 34c; 2000 lb to min carload, 36c; 500 lb to 1999 lb, 38c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal, 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk 1.50% C grade, 18-20% Si, 12.8c per lb of alloy. Packed, c.l. 14c, ton 14.45c, less ton 15.45c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade Si 12-14.5%, deduct 0.4c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $200 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4.5%). Contract $225 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l. lump, bulk, 27.75c per lb of contained Cr; c.l. packed 29.3c, ton lot 31.05c; less ton 32.45c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-71%). Contract, carload, lump, bulk, C 0.025% max (Simplex) 34.75c per lb contained Cr, 0.02% max 41.5c, 0.03% max 41c, 0.06% max 39.5c, 0.1% max 39c, 0.15% max 38.75c, 0.2% max 38.5c, 0.5% max 38.25c, 1.0% max 37.5c, 1.5% max 37.35c, 2.0% max 37.25c. Ton lot, add 3.4c, less ton add 5.1c. Carload packed add 1.75c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). Contract, c.l., 2 in. x D, bulk 29.05c per lb of contained Cr. Packed, c.l. 30.65c, ton 32.45c, less ton 33.95c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). Contract, carload, packed, 8M x D, 20.85c, per lb of alloy, ton lot 22.10c; less ton lots 23.3c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome-Silicon: (Cr 39-41%, Si 42-49%, C 0.05% max). Contract, carload, lump, 4" x down and 2" x down, bulk, 41.35c per lb of contained Cr; 1" x down, bulk, 42.35c. Delivered.

Chromium Metal, Electrolytic: Commercial grade (Cr 99.8% min, metallic basis, Fe 0.2% max). Contract, carlot, packed 2" x D plate (about ⅛" thick) $1.29 per lb, ton lot $1.31, less ton lot $1.33. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth Grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55%, or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1 $1.05 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.0c per lb of contained Si. Packed 21.40c; ton lot 22.50c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 13c per lb of contained Si. Packed c.l. 15.5c, ton lot 16.95c, less ton 18.6c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Contract, carload, lump, bulk, 15.25c per lb contained silicon. Packed, c.l. 17.25c, ton lot 19.05c; less ton 20.4c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Contract, carload, lump, bulk, 16.4c per lb of contained Si. Packed, c.l. 18.30c, ton lot 19.95c, less ton 21.2c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Contract, carload, lump, bulk, 19.5c per lb of contained Si. Packed, c.l. 21.15c, ton lot 22.55c, less ton 23.6c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 0.75% max Fe, 0.07% max Ca). C.l. lump, bulk, 20.00c per lb of Si. Packed, c.l. 21.65c, ton lot 22.95c, less ton 23.95c. Add 0.5c for max 0.03% Ca grade. Deduct 0.5c for max 1% Fe grade analyzing min 99.75% Si; 0.75c for max 1.25% Fe grades analyzing min 96.75% Si. Spot, add 0.25c.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 10.65c per lb of alloy; ton lot, packed, 11.8c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l. lump, bulk 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Contract, carload, lump, packed 27.25c per lb of alloy, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices, 100 lb and over, are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Bortam: (B 1.5-1.9%). Ton lot, 45c per lb; less than ton lot, 50c per lb.

Carbortam: (1 to 2%). Contract, lump, carload 9.50c per lb f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Contract, carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3⅜ lb each and containing 2 lb of Cr). Contract, carload, bulk 19c per lb of briquet, carload packed in box pallets 19.2c, in bags 20.1c; 3000 lb to c.l. in box pallets 20.4c; 2000 lb to c.l. in bags, 21.3; less than 2000 lb in bags 22.2c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Contract, carload, bulk 14.8c per lb of briquet; c.l., packed, pallets 15c, bags 16c; 3000 lb to c.l., pallets 16.2c; 2000 lb to c.l. bags, 17.2c; less ton 18.1c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). Contract, c.l. bulk 15.1c per lb of briquet; c.l. packed, pallets, 15.3c; bags 16.3c, 3000 lb to c.l., pallets, 16.5c; 2000 lb to c.l., bags 17.5c; less ton 18.4c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si). Contract, carload, bulk 7.7c per lb of briquet; packed, pallets, 7.9c; bags 8.9c; 3000 lb to c.l., pallets 9.5c; 2000 lb to c.l. bags 10.5c; less ton 11.4c. Delivered. Spot, add 0.25c. (Small size—weighing approx 2½ lb and containing 1 lb of Si). Carload, bulk 7.85c. Packed, pallets 8.05c; bags 9.05c; 3000 lb to c.l. pallets 9.65c; 2000 lb to c.l. bags 10.65c; less ton 11.55c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.41 per pound of Mo contained, f.o.b. Langeloth, Pa.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). 5000 lb W or more $2.95 per lb of contained W; 2000 lb W to 5000 lb W, $3.05; less than 2000 lb W, $3.17. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 8% max, C 0.4% max). Contract, ton lot 2" x D, $4.90 per lb of contained Cb. Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx, Ta 20% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lot 2" x D, $4.25 per lb of contained Cb plus Ta, delivered; less ton lot $4.30.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5.7%, Fe 20% approx). Contract, c.l. packed ½-in. x 12 M 19c per lb of alloy, ton lot 20.15c, less ton 21.4c. Delivered. Spot, add 0.25c.

Graphidox No. 5: (Si 48-52%, Ca 5.7%, Ti 9-11%). C.l. packed, 19c per lb of alloy, ton lot 20.15c; less ton lot 21.4c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.1c per lb of alloy; ton lot 19.55c; less ton lot 20.8c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Simanal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk 18.50c. Packed c.l. 19.50c, 2000 lb to c.l. 20.50c, less than 2000 lb 21c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $4 for each 1% of P above or below the base); carload, f.o.b. sellers' works. Mt. Pleasant, Siglo, Tenn., $110 per gross ton.

Ferromolybdenum: (55-75%). Per lb of contained Mo, in 200-lb container, f.o.b. Langeloth and Washington, Pa., $1.68 in all sizes except powdered which is $1.74.

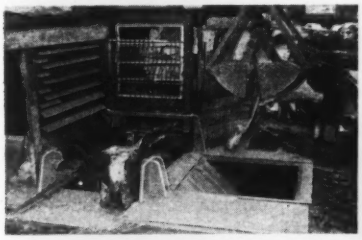
Technical Molybdic-Oxide: Per lb of contained Mo, in cans, $1.39; in bags, $1.38, f.o.b. Langeloth and Washington, Pa.

Loef Co. "From-Scale-to-Bale" Efficiency features 7-hour, 95,000 lb. production of Dempster-Balester!

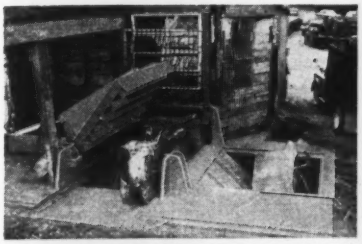
1. Load of scrap is weighed-in . . .

2. . . . by Mr. R. L. Blumberg.

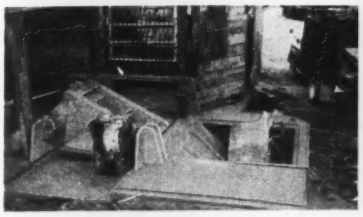
3. Crane takes scrap from truck . . .



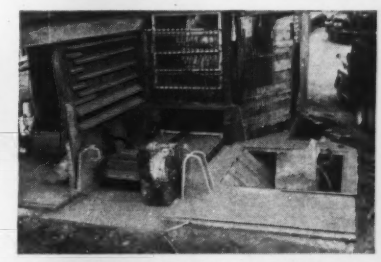
4. . . . to Dempster-Balester's Skip Pan.



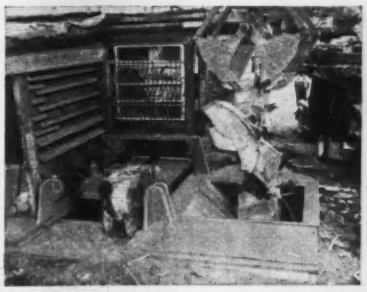
5. Auxiliary-Compression Door CRUSHES . . .



6. . . . preceding charge into charging box.



7. Charging Box Door closes; scrap is baled.



8. Then bale is ejected—a 1-2-3 operation. 1. Skip Pan LOADS Charging Box. 2. Auxiliary-Compression Door CRUSHES scrap metal deep into box. Charging Box Door closes and charge is baled while Skip Pan is re-loaded. 3. Then, bale is EJECTED and Skip Pan dumps another load into charging box — a fast, continuous and efficient baling cycle that permits you to produce compact, high density bales, one-after-another!

Note how Dempster-Balester operator moves Skip-Pan Loader up to dump next charge into box and simultaneously moves Auxiliary-Compression Door down to CRUSH the scrap when it is dumped into box.

Note above that with usually one stroke the scrap is CRUSHED into charging box, ready for baling.

Business men in Athens, Ga., call The Loef Company's scrap metal collection operation a "from-scale-to-bale" production plant. It's a tribute to the efficient operation at The Loef Co., headed by Harry Loef.

Turning salvable scrap metal into segregated re-usable products calls for engineering. And hundreds of scrap metal engineers like Harry Loef and son-in-law R. L. Blumberg weigh-in scrap secured by regular collectors . . . then, minutes later, compress the loads into compact bales by efficient, fast Dempster - Balester presses!

MR. HARRY LOEF

For eight years The Loef Co. used a Dempster - Balester Model "275". This, their first press, produced on the average of 90,000 lbs. of baled scrap in 14 hours. When the operation expanded and a faster press was required, the "like new and still efficient" Model "275" was sold and Mr. Loef purchased the faster Dempster-Balester Model "700". The "700" increased production to an average of 95,000 lbs. of baled scrap in 7 hours! However, although not in an industrial area, a 109,000 lb. carload of lamination was recently purchased for a test-run through the press. The Dempster-Balester accomplished the task in 1 hour and 33 minutes. "That just gives you an idea what this Dempster-Balester can do," reported Foreman J. J. Escoe, who added: "Too, of course, much of the credit belongs to Henry Knight, our crane operator, and Mark Garing, press operator. They're good!"

Big advantages of the Dempster-Balesters, according to Mr. Loef, are minimum investment, minimum installation expense and high operating efficiency. "We just don't have any maintenance to speak of," added Mr. Escoe. "But, we clean and grease our Dempster-Balester regularly. Might add that a man couldn't ask for any better parts service. Dempster Brothers sure take care of their presses."

High tribute to us. We appreciate it. We are proud of the accomplishments of our Dempster-Balesters, and of our service staff. We believe you, too, will find your wisest and most profitable press investment will be in a Dempster-Balester! Write us today for complete information. *Manufactured by Dempster Brothers, Inc.*

DEMPSTER BALESTER®

DEMPSTER BROTHERS, 677 DEMPSTER BLDG., Knoxville 17, Tenn.

an ounce of prevention!

It pays to periodically check the "health" of your blast-cleaning operation to prevent costs from creeping up. You may not be doing as well as say, a year ago. A check on abrasive prices (some have increased more than others), on abrasive consumption, on tonnage cleaned and on cost of replacement parts, will tell.

Such a check is easy to make using simple forms we supply. A sample set will be sent you on request.

One thing sure — if your operation is "ailing," Malleabrasive will cure, as it has in hundreds of other plants.

Competent service personnel available without obligation.

Sold by Pangborn Corporation, and by leading distributors of foundry supplies from coast to coast.

MALLEABRASIVE

THE GLOBE STEEL ABRASIVE CO., MANSFIELD, OHIO ®

1907—Fiftieth Anniversary—1957

Canada . . .

The price on steel bars at Hamilton, Ont., has been marked up $5 a ton, now being quoted at $5.40 per 100 lb, f.o.b. Hamilton. Other product prices are unchanged, but expectations are the price increase in the U.S. will be reflected to some degree in Canada.

Iron and steel production in Canada continues to run ahead of previous records. In April, pig iron output was 324,961 net tons, against 334,710 in March and 287,083 in April, 1956. Production of steel ingots and castings in April totaled 450,065 net tons against 475,146 in March and 434,066 in April a year ago.

Cumulative production of pig iron in the first four months this year was 1,256,308 net tons, compared with 1,133,266 in the like period last year. Steel output was 1,816,884 tons against 1,709,129 a year ago.

At the end of April, stocks of pig iron amounted to 211,788 tons, compared with 183,260 tons on hand at the end of April, 1956.

Ferroalloys . . .

Ferroalloy Prices, Page 176

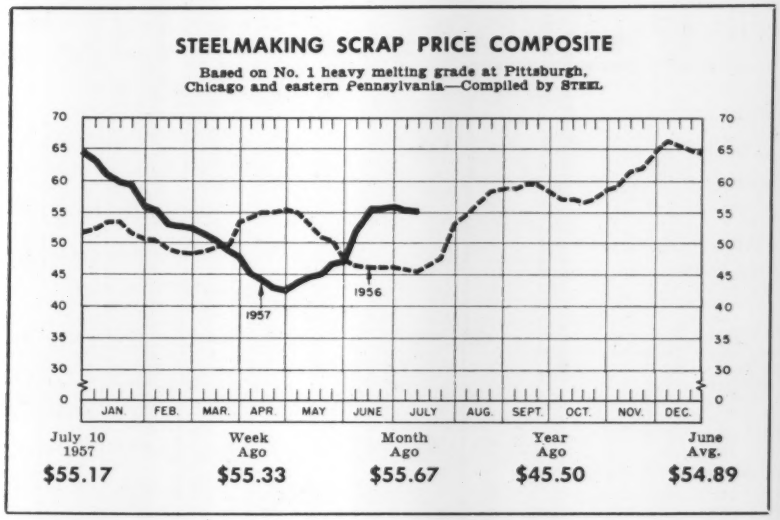
Domestic mine shipments of manganese ore in March increased 8 per cent over February to 28,200 short tons, reports the Bureau of Mines. Montana and Nevada supplied 53 per cent of the total, Arizona 23 per cent, Arkansas 9 per cent, New Mexico 5 per cent and California, Georgia, Minnesota, Tennessee and Virginia the remaining 10 per cent.

Shipments of manganiferous and ferruginous ore totaled 4000 short tons, coming from Montana and New Mexico.

Imports of manganese ore containing 35 per cent manganese totaled 277,081 short tons.

Imports of ferromanganese at 62,038 short tons of ore equivalent were more than 4½-times those of February. The total quantity of new material (domestic mine shipments, plus imports of ore and alloy in terms of ore) increased 114 per cent to 367,319 tons.

Production of manganese alloys (ferromanganese, silicomanganese and manganese metal) decreased 12 per cent to 99.538 tons.



Scrap Marking Time Seasonally

Prices decline for second straight week, STEEL's composite on the prime grades slipping another 16 cents to $55.17. Vacation slump in buying seen extending through July

Scrap Prices, Page 180

Chicago—Scrap market activity is bearing out earlier predictions of restricted volume and considerable price stability this month. Mill buying is light, and price fluctuations are few even though steelmaking in the district is running higher than anticipated. Currently it is 86.5 per cent of capacity, compared with 84.5 in late June. Brokers continue to purchase scrap from dealers to fill old orders. Dealers do not appear anxious to expand sales since they feel a stronger market is bound to come with the expected upturn in steelmaking. Industrial generation of scrap is at the year's low, with many manufacturers closed for vacations.

Pittsburgh—An undercurrent of strength is shown by rising prices on the cast iron grades, railroad scrap and factory bundles. There have been no important sales of the leading heavy melting grades recently. Large users of No. 1 heavy melting are sounding out the market for lower prices. They hold large inventories. Railroad scrap increased $2 a ton on the latest lists. Cast grades rose similarly.

Philadelphia—Domestic demand is light, with prices unchanged. The only activity of any consequence is in steel scrap for export. At least three cargoes are scheduled to leave this port in July. This is adding strength to the general market undertone, along with prospects that domestic mills will resume buying on a larger scale shortly.

Boston—Steel scrap buying is light, and prices are somewhat easier for domestic shipment. For export, delivered dock, $52 is being paid for No. 1 heavy melting. Higher prices are being paid by brokers for export, and lack of buying by domestic mills centers activity on boat loading.

Buffalo—Local prices are nominally unchanged, but the market tone is softer. Buffalo mills' offers are below those at other centers within shipping distance. So it is not thought prices will decline here, even though they should slip at other consuming points. With most foundries closed for vacations, there is virtually no buying of cast grades. A few June mill orders still outstanding are being cleaned up.

Cleveland — Seasonal sluggishness in the scrap market is expected to continue through the remainder of this month. But the tone is fairly strong. Sellers anticipate a spurt in buying before fall as the mills prepare for an active fourth quarter campaign. Foundry requirements are expected to rise.

Detroit—No action is reported in the scrap market here. Dealers say the present lull is typical of the summer slump, resulting in part from the closing of a couple of local mills for mass vacations.

Cincinnati—The scrap market is steady. No. 1 heavy melting steel is $51-$52, brokers' buying price. Brokers are having little difficulty filling old orders. Foundry grades failed to react to the stronger situation in the steelmaking grades, largely because of plant suspensions for vacations.

St. Louis—Scrap sales are light here. Though mill stocks are small, they are considered adequate for the current reduced rate of operations. Shipments from rural areas are limited. Demand for railroad grades is off sharply.

San Francisco—Steel scrap prices have become stabilized following the recent increase of $3 a ton on No. 2 heavy melting steel. Exporters still are paying prices above the domestic mills' posted quotations for certain grades.

Los Angeles—The scrap market is firm, with higher prices in the East reflected in local quotations. Steelmaking operations continue at capacity. Mill purchases of scrap are high for this season.

Iron Ore . . .

Iron Ore Prices, Page 175

Shipments of iron ore from the upper lakes totaled 3,207,421 gross tons in the week ended July 8, reports the American Iron Ore Association. This was an increase of 1,626,682 tons, compared with shipments in the like week a year ago when a strike was under way.

Cumulative deliveries to lower lake ports to July 8 total 33,588,-609 tons. In the like period of 1956, the movement amounted to 32,824,681 tons.

Columbia-Geneva Steel Division, U.S. Steel Corp., San Francisco, has exercised an option on 1200 acres of iron ore properties in Fre-

(*Please turn to page* 185)

Iron and Steel Scrap

Consumer prices, per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL, July 10, 1957. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

July 10	$53.17
July 3	55.33
June Avg.	54.89
July 1956	47.70
July 1952	42.60

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	56.00-57.00
No. 2 heavy melting	51.00-52.00
No. 1 factory bundles	*62.00-63.00*
No. 1 dealer bundles	56.00-57.00
No. 2 bundles	46.00-47.00
No. 1 busheling	56.00-57.00
Machine shop turnings	33.00-34.00
Mixed borings, turnings	33.00-34.00
Short shovel turnings	37.00-38.00
Cast iron borings	37.00-38.00
Cut structurals:	
2 ft and under	63.00-64.00
3 ft lengths	62.00-63.00
Heavy turnings	49.00-50.00
Punchings & plate scrap	62.00-63.00
Electric furnace bundles	62.00-63.00

Cast Iron Grades

No. 1 cupola	*49.00-50.00*
Heavy breakable cast	*46.00-47.00*
Unstripped motor blocks	*36.00-37.00*
No. 1 machinery cast	*58.00-59.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*63.00-64.00*
Rails, 2 ft and under	*72.00-73.00*
Rails, 18 in. and under	*74.00-75.00*
Rails, random lengths	*70.00-71.00*
Railroad specialties	*70.00-71.00*

Stainless Steel Scrap

18-8 bundles & solids	300.00-315.00
18-8 turnings	190.00-215.00
430 bundles & solids	75.00-80.00
430 turnings	55.00-60.00

CLEVELAND

No. 1 heavy melting	51.00-52.00
No. 2 heavy melting	46.00-47.00
No. 1 factory bundles	55.00-56.00
No. 1 bundles	51.00-52.00
No. 2 bundles	43.00-44.00
No. 1 busheling	51.00-52.00
Machine shop turnings	20.00-21.00
Short shovel turnings	*25.00-26.00*
Mixed borings, turnings	*25.00-26.00*
Cast iron borings	*25.00-26.00*
Cut foundry steel	*55.00-56.00*
Cut structurals, plates 2 ft and under	*63.00-64.00*
Low phos. punchings & plate	54.00-55.00
Alloy free, short shovel turnings	*28.00-29.00*
Electric furnace bundles	54.00-55.00

Cast Iron Grades

No. 1 cupola	53.00-54.00
Charging box cast	*43.00-44.00*
Heavy breakable cast	41.00-42.00
Stove plate	50.00-51.00
Unstripped motor blocks	37.00-38.00
Brake shoes	41.00-42.00
Clean auto cast	54.00-55.00
Burnt cast	39.00-40.00
Drop broken machinery	56.00-57.00

Railroad Scrap

No. 1 R.R. heavy melt.	57.00-58.00
R.R. malleable	61.00-62.00
Rails, 2 ft and under	*75.00-76.00*
Rails, 18 in. and under	*76.00-77.00*
Rails, random lengths	68.00-69.00
Cast steel	63.00-64.00
Railroad specialties	65.00-66.00
Uncut tires	63.00-64.00
Angles, splice bars	*67.00-68.00*
Rails, rerolling	*73.00-74.00*

Stainless Steel
(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	300.00-310.00
18-8 turnings	200.00-210.00
430 clips, bundles, solids	75.00-80.00
430 turnings	40.00-50.00

YOUNGSTOWN

No. 1 heavy melting	54.00-55.00
No. 2 heavy melting	49.00-50.00
No. 1 bundles	54.00-55.00
No. 2 bundles	46.00-47.00
No. 1 busheling	54.00-55.00
Machine shop turnings	20.00-21.00
Short shovel turnings	*26.00-27.00*
Cast iron borings	*26.00-27.00*
Low phos.	59.00-60.00
Electric furnace bundles	*59.00-60.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*63.00-64.00*

CHICAGO

No. 1 heavy melt., indus.	54.00-55.00
No. 1 hvy melt., dealer	*51.00-52.00*
No. 2 heavy melting	44.00-45.00
No. 1 factory bundles	57.00-58.00
No. 1 dealer bundles	*53.00-54.00*
No. 2 bundles	41.00-42.00
No. 1 busheling, indus.	54.00-55.00
No. 1 busheling, dealer	*51.00-52.00*
Machine shop turnings	32.00-33.00
Mixed borings, turnings	34.00-35.00
Short shovel turnings	34.00-35.00
Cast iron borings	34.00-35.00
Cut structurals, 3 ft.	*55.00-56.00*
Punchings & plate scrap	*56.00-57.00*

Cast Iron Grades

No. 1 cupola	47.00-48.00
Stove plate	45.00-46.00
Unstripped motor blocks	35.00-36.00
Clean auto cast	51.00-52.00
Drop broken machinery	51.00-52.00

Railroad Scrap

No. 1 R.R. heavy melt.	56.00-57.00
R.R. malleable	62.00-63.00
Rails, 2 ft and under	75.00-76.00
Rails, 18 in. and under	76.00-77.00
Angles, splice bars	67.00-68.00
Rails, rerolling	*76.00-77.00*

Stainless Steel Scrap

18-8 bundles & solids	320.00-325.00
18-8 turnings	220.00-225.00
430 bundles & solids	75.00-80.00
430 turnings	55.00-60.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	46.00-47.00
No. 2 heavy melting	34.00-35.00
No. 1 bundles	46.00-47.00
No. 2 bundles	34.00-35.00
No. 1 busheling	46.00-47.00
Machine shop turnings	27.00-28.00
Mixed borings, turnings	28.00-29.00
Short shovel turnings	29.00-30.00
Punchings & plate scrap	56.00-57.00

Cast Iron Grades

No. 1 cupola	48.00
Charging box cast	41.00
Stove plate	42.00
Heavy breakable	38.00
Unstripped motor blocks	28.00
Clean auto cast	50.00
Malleable	52.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	45.50
No. 2 heavy melting	43.00
No. 1 bundles	45.50
No. 2 bundles	38.00
No. 1 busheling	45.50
Machine shop turnings	30.00
Short shovel turnings	32.00

Cast Iron Grades

No. 1 cupola	48.00
Charging box cast	40.00
Heavy breakable cast	40.00
Unstripped motor blocks	40.00
Brake shoes	40.00
Clean auto cast	48.00
Stove plate	42.00

Railroad Scrap

No. 1 R.R. heavy melt.	57.00
Rails, 18 in. and under	74.00
Rails, rerolling	72.00
Rails, rerolling	68.00
Angles, splice bars	62.00

PHILADELPHIA

No. 1 heavy melting	56.00
No. 2 heavy melting	48.00-49.00
No. 1 bundles	57.00
No. 2 bundles	47.00
No. 1 busheling	57.00
Electric furnace bundles	59.00
Mixed borings, turnings	40.00†
Short shovel turnings	42.00
Machine shop turnings	39.00
Heavy turnings	52.00
Structurals & plate	59.00-61.00
Couplers, springs, wheels	66.00
Rail crops, 2 ft & under	69.00-71.00

Cast Iron Grades

No. 1 cupola	49.00
Heavy breakable cast	55.00
Malleable	62.00
Drop broken machinery	57.00-58.00

†Nominal

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	52.00-53.00
No. 2 heavy melting	42.00-43.00
No. 1 bundles	52.00-53.00
No. 2 bundles	41.00-42.00
Machine shop turnings	28.00-28.50
Mixed borings, turnings	28.00-28.50
Short shovel turnings	30.00-31.00
Low phos. (structural & plate)	55.00-56.00

Cast Iron Grades

No. 1 cupola	46.00-47.00
Unstripped motor blocks	39.00-40.00
Heavy breakable	46.00-47.00

Stainless Steel

18-8 shets, clips solids	280.00-290.00
18-8 borings, turnings	180.00-190.00
430 sheets, clips, solids	60.00-70.00
410 sheets, clips, solids	50.00-55.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	43.00-44.00
No. 2 heavy melting	*36.50-37.50*
No. 1 bundles	43.00-44.00
No. 2 bundles	35.00-36.00
No. 1 busheling	42.00-43.00
Machine shop turnings	25.00-26.00
Mixed borings, turnings	28.00-29.00
Short shovel turnings	30.00-31.00
No. 1 cast	34.00-35.00
Mixed cupola cast	33.00-34.00
No. 1 machinery cast	42.00-43.00

BUFFALO

No. 1 heavy melting	46.00-47.00
No. 2 heavy melting	39.00-40.00
No. 1 bundles	46.00-47.00
No. 2 bundles	36.00-37.00
No. 1 busheling	46.00-47.00
Mixed borings, turnings	35.00-36.00
Machine shop turnings	33.00-34.00
Short shovel turnings	36.00-37.00
Cast iron borings	35.00-36.00
Low phos.	53.00-54.00

Cast Iron Grades
(F.o.b. shipping point)

No. 1 cupola	45.00-46.00
No. 1 machinery	50.00-51.00

Railroad Scrap

Rails, random lengths	61.00-62.00
Rails, 3 ft and under	66.00-67.00
Railroad specialties	59.00-60.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	51.00-52.00
No. 2 heavy melting	44.00-45.00
No. 1 bundles	51.00-52.00
No. 2 bundles	42.00-43.00
No. 1 busheling	51.00-52.00
Machine shop turnings	32.00-33.00
Mixed borings, turnings	30.00-31.00
Short shovel turnings	35.00-36.00
Cast iron borings	30.00-31.00
Low phos. 18 in.	56.00-57.00

Cast Iron Grades

No. 1 cupola	45.00-46.00
Heavy breakable cast	42.00-43.00
Charging box cast	42.00-43.00
Drop broken machinery	55.00-56.00

Railroad Scrap

No. 1 R.R. heavy melt.	55.00-56.00
Rails, 18 in. and under	70.00-71.00
Rails, random lengths	62.00-63.00

BIRMINGHAM

No. 1 heavy melting	49.00-50.00
No. 2 heavy melting	39.00-40.00
No. 1 bundles	49.00-50.00
No. 2 bundles	37.00-38.00
No. 1 busheling	49.00-50.00
Cast iron borings	28.00-29.00
Short shovel turnings	38.00-39.00
Machine shop turnings	37.00-38.00
Bar crops and plates	54.00-55.00
Structurals & plate	54.00-55.00
Electric furnace bundles	50.00-51.00
Electric furnace:	
3 ft and under	47.00-48.00
2 ft and under	48.00-49.00

Cast Iron Grades
(F.o.b. shipping point)

No. 1 cupola	53.00-54.00
Stove plate	53.00-54.00
Unstripped motor blocks	*44.00-45.00*
Charging box cast	34.00-35.00
No. 1 wheels	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	53.00-54.00
Rails, 18 in. and under	65.00-66.00
Rails, rerolling	*67.00-68.00*
Rails, random lengths	59.00-60.00
Angles, splice bars	59.00-60.00

SEATTLE

No. 1 heavy melting	49.00
No. 2 heavy melting	44.00
No. 1 bundles	44.00
No. 2 bundles	30.00
Machine shop turnings	28.00
Mixed borings, turnings	28.00
Electric furnace No. 1	54.00

Cast Iron Grades

No. 1 cupola	45.00
Heavy breakable cast	42.00
Unstripped motor blocks	35.50
Stove plate (f.o.b. plant)	30.00

LOS ANGELES

No. 1 heavy melting	48.00
No. 2 heavy melting	43.00
No. 1 bundles	47.00
No. 2 bundles	34.00
Machine shop turnings	32.00
Shoveling turnings	34.00
Cast iron borings	32.00
Cut structural and plate, 1 ft and under	57.00

Cast Iron Grades
(F.o.b. shipping point)

No. 1 cupola	53.00

Railroad Scrap

No. 1 R.R. heavy melt.	46.00

SAN FRANCISCO

No. 1 heavy melting	48.00
No. 2 heavy melting	46.00
No. 1 bundles	47.00
No. 2 bundles	35.00
Machine shop turnings	32.00
Mixed borings, turnings	32.00
Cast iron borings	32.00
Heavy turnings	32.00
Short shovel turnings	34.00
Cut structurals, 3 ft	56.00

Cast Iron Grades

No. 1 cupola	53.00
Charging box cast	45.00-47.00
Stove plate	46.00
Heavy breakable cast	40.00
Unstripped motor blocks	48.00
Clean auto cast	55.00
No. 1 wheels	48.00
Drop broken machinery	53.00

HAMILTON, ONT.

No. 1 heavy melting	43.00
No. 2 heavy melting	38.00
No. 1 bundles	43.00
No. 2 bundles	32.00
Mixed steel scrap	35.00
Mixed borings, turnings	19.00
Busheling, new factory:	
Prepared	43.00
Unprepared	37.00
Short steel turnings	30.00
Rails, rerolling	49.00

Cast Iron Grades†

No. 1 machinery cast	50.00

†F.o.b. Hamilton, Ont.

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LEADERS IN IRON AND STEEL SCRAP SINCE 1889

Vacations Dull Market

Most producers maintain normal operations in face of customer slowdowns. It's hoped anticipated order upsurge will be strong enough to reduce growing stocks

Nonferrous Metal Prices, Pages 184 & 185

VACATIONS are having their traditional depressing effect on the nonferrous market.

Most producers are maintaining normal or near normal production, although many of their customers are suspending operations for two to three weeks or otherwise curtailing them.

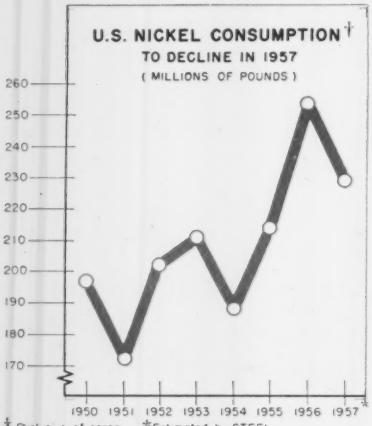
By the middle of August, most producers and their customers will have gone through the vacation cycle. That's when metals men hope for an order upsurge.

Problem: Unless the expected sales upswing is greater than usual, it won't buoy either demand or prices for long. Here's why: The nonferrous market, especially copper, lead and zinc, is duller than it has been in years. Unsold stocks were too large before the vacation period began—they will build up even more during the next four to six weeks. Without a sharp rise in demand, unsold stocks could spur further price cuts.

Lead, Zinc—No major company plans a shutdown. July, historically a slow month, could be even slower for the industry this year. Customer vacations currently hold back new orders, but producers see the picture improving by late August. Strength of this postvacation demand could set the fourth quarter price pattern.

Aluminum—Employee vacations go on as usual, but most companies continue normal operations. The market is firming, and producers don't look for customer vacations to delay new orders. Industry observers forecast a strong upsurge in business beginning in August.

Copper—One major producer suspended operations for two weeks this month. This should help buoy the market and reduce unsold stocks. Other companies operate on normal schedules. Slack ordering during the vacation season is reducing the already low



† Exclusive of scrap. *Estimated by STEEL
Source: U.S. Bureau of Mines.

customer inventories and makes an August buying upsurge likely. Example: Brass mills closed down for their traditional two-week vacation this month. This will cut into primary producers' shipments for July, but mills will step up orders around Aug. 1. It's evident new orders have to start rolling in if the price line is to hold.

Magnesium—No vacation shutdown is planned for primary facilities. Dow Chemical Co.'s rolling mill at Madison, Ill., closed down the first two weeks in July, and the company's Bay City, Mich., foundry will be down for one week this month. Usually, a slack period occurs during the July vacation period, followed by an order upsurge which continues into the fall months.

It's a general practice for the industry's 150-odd fabricators to take a two-week vacation shutdown. This should have little effect on their sales. Reasons: 1. Most of the industry's production goes to defense. 2. There is little spot selling.

Nickel—Mines will produce at normal operating rates. International Nickel Co.'s Huntington (W. Va.) rolling mill plans a two-week vacation shutdown the latter part of the month. New orders are expected to be down for the rest of July and throughout August because of less consumer buying. But there's a large order backlog (18 months) which means the industry will not be too affected by the buying slowdown.

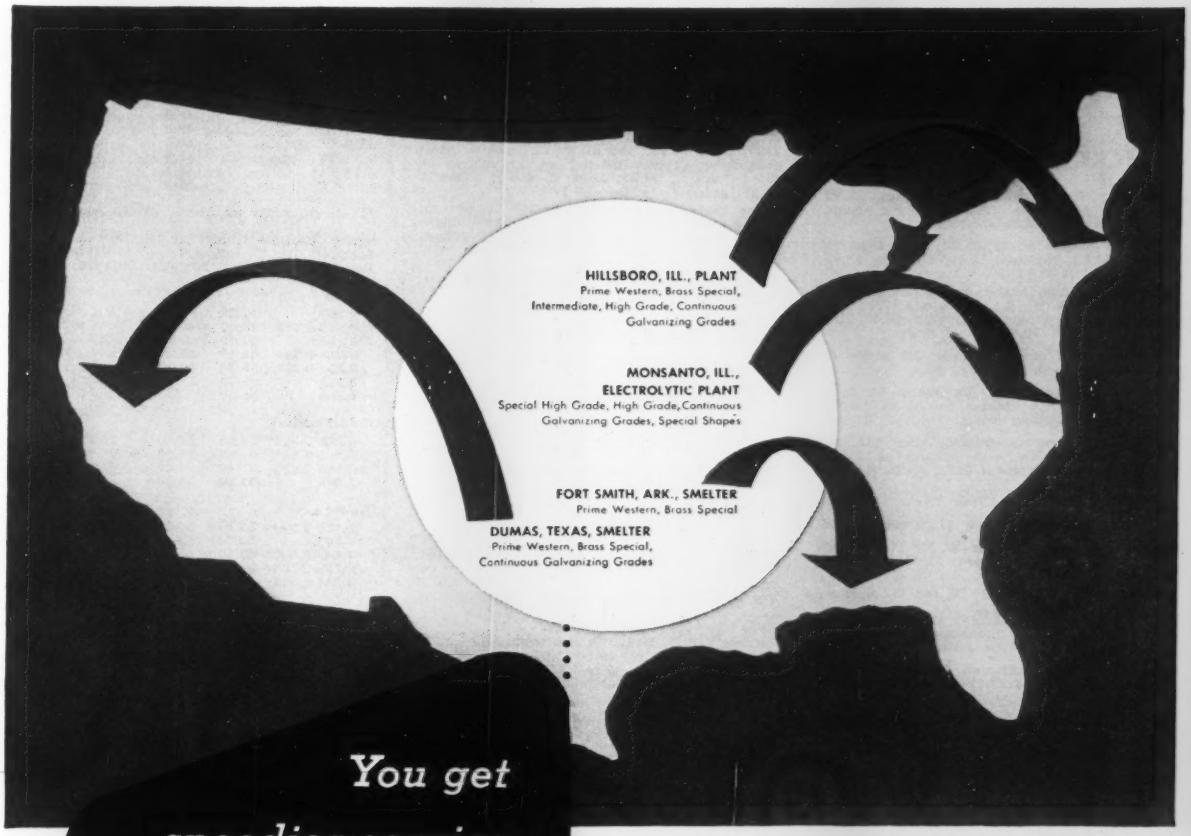
Market Memos

- International Nickel Co.'s proposal to sell part of its expanded nickel output to the U.S. stockpile has been turned down by the government.
- You hear more talk that Chile will soon order a production slash in its copper mines to bolster the world price. Informed sources say the Chilean government is studying an agreement with American-owned copper companies to reduce their production by about 10 per cent.

NONFERROUS PRICE RECORD

	Price July 9	Last Change	Previous Price	June Avg.	May Avg.	July, 1956 Avg.
Aluminum	27.10	Aug. 10, 1956	25.90	27.100	27.100	25.900
Copper	28.50–29.25	July 1, 1957	29.00–29.25	30.250	31.087	40.030
Lead	13.80	June 11, 1957	14.80	14.120	15.185	15.800
Magnesium	35.25	Aug. 13, 1956	33.75	35.250	35.250	33.750
Nickel	74.00	Dec. 6, 1956	64.50	74.000	74.000	64.500
Tin	96.875	July 9, 1957	97.375	98.080	98.341	96.435
Zinc	10.00	July 1, 1957	10.50	10.840	11.923	13.500

Quotations in cents per pound based on: COPPER, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary ingots, 99 + %, deld.; MAGNESIUM, pig, 99.8%, Velasco, Tex.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PRIMARY METALS AND ALLOYS

Aluminum: 99+%, ingots, 27.10; pigs, 25.00, 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 28.90; No. 43, 28.70; No. 195, 30.30; No. 241, 30.50; No. 356, 28.90, 30-lb ingots.

Antimony: R.M.M. brand, 99.5%, 33.00; Lone Star brand, 33.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 27.50-28.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97%, lump or beads, $71.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $74.75 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.25% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld.

Cobalt: 97-99%, $2.00 per lb for 550-lb keg; $2.02 per lb for 100-lb case; $2.07 per lb under 100 lb.

Columbium: Powder, $119.20 per lb, nom.

Copper: Electrolytic, 29.25 deld. Conn. valley; 29.25 deld. Midwest; custom smelters, 28.50; lake, 29.25 deld.; fire refined, 29.00 deld.

Germanium: First reduction, $179.17-197.31 per lb; intrinsic grade, $197.31-220 per lb, depending on quantity.

Gold: U.S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $90-110 nom. per troy oz.

Lead: Common, 13.80; chemical, 13.90; corroding, 13.90, St. Louis. New York basis, add 0.20.

Lithium: 98+%, cups or ingots, $11.50; rod, $13.50; shot or wire, $14.50, f.o.b. Minneapolis, 100 lb lots.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex.; 13 in. sticks, 59.00 f.o.b. Madison, Ill.

Magnesium Alloys: AZ91B (die casting), 37.25 deld.; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $255-257 per 76-lb flask.

Molybdenum: Extruded ingot, $9.60 per pound, f.o.b. Detroit.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot or ingots for addition to cast iron, 74.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01.

Osmium: $80-100 per troy oz, nom.

Palladium: $23-24 per troy oz.

Platinum: $89-95 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $118-125 per troy oz.

Ruthenium: $45-55 per troy oz.

Selenium: $10.50 per lb, commercial grade.

Silver: Open market, 90.25 per troy oz.

Sodium: 16.50, c.l.; 17.00 l.c.l.

Tantalum: Rod, $58.06 per lb; sheet, $45.36 per lb.

Tellurium: $1.65-1.85 per lb.

Thallium: $12.50 per lb.

Tin: Straits, N.Y., spot, 96.875; prompt, 96.75.

Titanium: Sponge, 99.3+%, grade A-1 ductile (0.3% Fe max.), $2.25; grade A-2 (0.5% Fe max.), $2.00 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $3.75 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99+% hydrogen reduced, $4.60.

Zinc: Prime Western, 10.00; brass special, 10.25; intermediate, 10.50, East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 11.35; special high grade, 11.75 deld. Die casting alloy ingot No. 3, 14.25; No. 2, 15.25; No. 5, 14.75 deld.

Zirconium: Sponge, commercial grade, $5-10 per lb.

(Note: Chromium, manganese and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 23.50-29.00; No. 12 foundry alloy (No. 2 grade), 21.50-23.00; 5% silicon alloy, 0.60 Cu max., 25.00-25.50; 13 alloy, 0.60 Cu max., 25.00-25.50; 195 alloy, 24.50-26.25; 108 alloy, 22.00-23.00. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.25; grade 2, 21.50; grade 3, 20.50; grade 4, 19.50.

Brass Ingot: Red brass, No. 115, 29.50; tin bronze, No. 225, 39.00; No. 245, 33.50; high-leaded tin bronze, No. 305, 33.50; No. 1 yellow, No. 405, 24.00; manganese bronze, No. 421, 27.00.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.50; AZ91C, 37.50; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.80, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.77, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 30,000-lb lots, 34.605; l.c.l, 35.23. Weatherproof, 30,000-lb lots, 35.72; l.c.l., 36.47. Magnet wire deld., 15,000 lb or more, 41.93; l.c.l., 42.68.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $19.50 per cwt; pipe, full coils, $19.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheets and strip, $9.50-15.95; sheared mill plate, $8.00-11.50; wire, $7.50-11.50; forging billets, $6.00-7.60; hot-rolled and forged bars, $6.15-7.90.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 24.00; ribbon zinc in coils, 20.50; plates, 19.00.

ZIRCONIUM

Plate, $12.50-19.20; H.R. strip, $12.50-22.90; C.R. strip, $15.00-31.25; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	126	106	128
Strip, C.R.	124	108	138
Plate, H.R.	120	105	121
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

Sheet and Circles: 1100 and 3003 mill finish (30,000 lb base; freight allowed).

Thickness Range Inches	Flat Sheet	Coiled Sheet
0.249-0.138	40.90-45.40	....
0.135-0.096	41.40-46.50	37.70-39.60
0.095-0.077	42.10-48.30	37.80-39.80
0.076-0.061	42.70-50.60	38.20-40.50
0.060-0.048	43.40-52.90	38.80-41.50
0.047-0.038	43.90-55.60	38.60-42.90
0.037-0.030	44.30-50.00	40.40-44.70
0.029-0.024	44.90-52.40	41.00
0.023-0.019	45.80-52.20	42.00
0.018-0.017	46.50-53.30	42.60
0.016-0.015	47.50-53.90	43.40
0.014	48.50-50.90	44.40
0.013-0.012	49.70-52.10	45.10
0.011	50.70-53.70	46.30
0.010-0.0095	52.10-54.40	47.60
0.009-0.0085	53.40	49.10
0.008-0.0075	55.00	50.30
0.007	56.50	51.80
0.006	58.10	53.20

ALUMINUM (continued)

Plates and Circles: Thickness 0.250-3 in., 24-60 in. width or diam., 72-240 in. lengths.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	40.2	44.5
5050-F	41.3	45.6
3004-F	42.3	47.5
5052-F	42.9	48.2
6061-T6	44.4	50.0
2024-T4*	48.1	54.4
7075-T6*	55.4	62.5

*24-48 in. width or diam., 72-180 lengths.

Screw Machine Stock: 30,000 lb base.

Diam. (in.) or across flats	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
Drawn				
0.125	74.30	71.50	....	....
0.156-0.172	63.00	60.40	....	....
0.188	63.00	60.40	....	76.40
0.219-0.234	59.70	57.20	....	....
0.250-0.281	59.70	57.20	....	73.00
0.313	59.70	57.20	....	69.60
0.344	58.50	....	....	....
Cold-Finished				
0.375-0.547	58.80	57.50	70.10	65.50
0.563-0.688	58.80	57.50	66.70	61.60
0.750-1.000	57.40	56.00	61.00	58.10
1.063	57.40	56.00	....	56.10
Rolled				
1.125-1.500	55.20	53.90	59.00	56.10
1.563	53.70	52.40	....	....
1.625-2.000	53.10	51.60	....	....
2.125-2.500	51.70	50.30	....	....
2.563-3.375	50.20	48.70	....	....

Forging Stock: Round, Class 1, 43.30-55.90 in specific lengths, 36-144 in., diam. 0.375-8 in. Rectangles and squares, Class 1, 48.10-63.20 in random lengths, 0.375-4 in. thick, width 0.0750-10 in.

Pipe: ASA schedule 40, alloy 6063-T6, standard lengths, plain ends, 90,000-lb base, per 100 ft.

Nom. Pipe Size (in.)		Nom. Pipe Size (in.)	
¾	$18.75	2	$ 57.00
1	29.00	4	157.30
1¼	39.25	6	281.65
1½	46.95	8	423.80

Extruded Solid Shapes:

Factor	Alloy 6063-T5	Alloy 6062-T6
9-11	43.10-44.60	57.80-61.80
12-14	43.40-44.80	58.40-62.70
15-17	43.60-45.40	59.60-64.30
18-20	44.10-45.80	61.50-66.80

MAGNESIUM

Sheet and Plate: AZ31B standard grade, 0.32 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.0 in., 67.90. AZ31B spec. grade, .032 in., 171.30; .081 in., 108.70; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Thread plate, .188 in., 71.70; .250-2.00 in., 70.60. Tooling plates, .250-3.0 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	69.60-72.40	84.60-87.40
12-14	70.70-73.00	85.70-88.00
24-26	75.60-76.30	90.60-91.30
36-38	89.20-90.30	104.20-105.30

NONFERROUS SCRAP

DEALER'S BUYING PRICES

(Cents per pound, New York, in ton lots.)

Aluminum: 1100 clippings, 13.00-13.50; old sheets, 10.00-10.50; borings and turnings, 6.50-

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES f		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	51.38b	48.61c	....	51.57	25.250	25.250	24.500
Yellow Brass	44.69	32.87d	45.23	47.60	19.125	18.875	17.375
Low Brass, 80%	47.40	47.34	47.94	50.21	21.375	21.125	20.625
Red Brass, 85%	48.36	48.30	48.90	51.17	22.250	22.000	21.500
Com. Bronze, 90%	49.86	49.80	50.40	52.42	23.125	22.875	22.375
Manganese Bronze	52.52	46.69	57.19	....	17.625	17.375	16.875
Muntz Metal	46.94	42.75	....	....	17.875	17.625	17.125
Naval Brass	48.85	43.16	55.91	52.26	17.625	17.375	16.875
Silicon Bronze	55.96	55.15	56.00	57.97e	24.750	24.500	24.750
Nickel Silver, 10%	61.52	63.85g	63.85	....	25.750	25.000	12.875
Phos. Bronze, A-5%	70.47	70.97	70.97	72.15	26.250	26.000	25.000

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. 3% silicon. f. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb. g. Leaded

7.00; crankcases, 10.00-10.50; industrial castings, 10.00-10.50.

Copper and Brass: No. 1 heavy copper and wire, 20.50-21.00; No. 2 heavy copper and wire, 19.00-19.50; light copper, 16.75-17.25; No. 1 composition red brass, 18.50-19.00; No. 1 composition turnings, 18.00-18.50; yellow brass turnings, 10.75-11.25; new brass clippings, 17.00-17.50; light brass, 10.50-11.00; heavy yellow brass, 12.50-13.00; new brass rod ends, 14.50-15.00; auto radiators, unsweated, 13.50-14.00; cocks and faucets, 14.50-15.00; brass pipe, 15.50-16.00.

Lead: Heavy 9.50-10.00; battery plates, 4.50; linotype and stereotype, 11.50-12.00; electrotype, 10.00-10.50; mixed babbitt, 11.00-11.50.

Monel: Clippings, 45.00-53.00; old sheets, 44.00-53.00; turnings, 35.00-43.00; rods, 45.00-53.00.

Nickel: Sheets and clips, 85.00-90.00; rolled anodes, 85.00-90.00; turnings, 70.00-75.00; rod ends, 85.00-90.00.

Zinc: Old zinc, 3.00; new die-cast scrap, 2.75; old die-cast scrap, 1.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Aluminum: 1100 clippings, 17.00-18.00; 3003 clippings, 17.00-18.00; 6151 clippings, 17.50; 5052 clippings, 17.00-17.50; 2014 clippings, 16.50-17.00; 2017 clippings, 16.50-17.00; 2024 clippings, 16.50-17.00; mixed clippings, 16.00; old sheets, 14.00-14.50; old cast, 14.00-14.50; clean old cable (free of steel), 16.50-17.50; borings and turnings, 14.50-15.50.

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 51.00; light scrap, 46.00; turnings and borings, 31.00.

Copper and Brass: No. 1 heavy copper and wire, 25.00; No. 2 heavy copper and wire, 22.875; light copper, 20.625; refinery brass (60% copper) per dry copper content, 21.75-21.875.

INGOTMAKERS' BUYING PRICES

(Cents per pound, carlots, delivered)

Copper and Brass: No. 1 heavy copper and wire, 25.00; No. 2 heavy copper and wire, 22.875; light copper, 20.625 No. 1 composition borings, 21.75; No. 1 composition solids, 22.00; heavy yellow brass solids, 15.50; yellow brass turnings, 14.50; radiators, 17.00.

PLATING MATERIALS

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.70 per lb.

Copper: Flat-rolled, 47.54; oval 45.75, 5000-10,000 lb; electrodeposited, 39.50, 2000-5000 lb lots; cast, 41.00, 5000-10,000 quantities.

Nickel: Depolarized, less than 100 lb, 101.50; 100-499 lb, 99.50; 500-4999 lb, 95.50; 5000-29,999 lb, 93.50; 30,000 lb, 91.50. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab; less than 200 lb, 115.50; 200-499 lb, 114.00; 500-999 lb, 113.50; 1000 lb or more, 113.00.

Zinc: Balls, 17.50; flat tops, 17.50; flats, 19.25; ovals, 18.50, ton lots.

CHEMICALS

Cadmium Oxide: $1.70 per lb in 100-lb drums.
Chromic Acid: 100 lb, 33.30; 500 lb, 32.80; 2000 lb, 32.15; 5000 lb, 31.80; 10,000 lb, 31.30, f.o.b. Detroit.

Copper Cyanide: 100-200 lb, 74.80; 300-900 lb, 72.80.

Copper Sulphate: 100-1900 lb, 15.20; 2000-5900 lb, 13.20; 6000-11,900 lb, 12.95; 12,000-22,900 lb, 12.70; 23,000 lb or more, 12.20.

Nickel Chloride: 100 lb, 48.50; 200 lb, 46.50; 300 lb, 45.50; 400 lb, 43.50; 5000 lb, 41.50; 10,000 lb, 40.50.

Nickel Sulphate: 100 lb, 40.50; 200 lb, 38.50; 300 lb, 37.50; 400-4900 lb, 35.50; 5000-29,900 lb, 33.50; 30,000 lb or more, 32.50.

Sodium Cyanide: 100 lb, 27.50; 200 lb, 25.80; 400 lb, 22.80; 1000 lb, 21.80; f.o.b. Detroit.

Sodium Stannate: Less than 100 lb, 76.90; 100-600 lb, 67.80; 700-1900 lb, 65.00; 2000-9900 lb, 63.10; 10,000 lb or more, 61.80.

Stannous Chloride (anhydrous): Less than 25 lb, 166.50; 25 lb, 131.50; 100 lb, 116.50; 400 lb, 114.10; 5200-19,600 lb, 101.90; 20,000 lb or more, 89.70.

Stannous Sulphate: Less than 50 lb, 129.30; 50 lb, 99.30; 100-1900 lb, 97.30; 2000 lb or more, 95.30.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from page* 179)

mont county, Wyo., owned by Ruby Co., Boise, Idaho. L. B. Worthington, Columbia-Geneva president, said no definite decision has been made to proceed with development of the property. Eventually, the ore will supplement Columbia-Geneva's iron ore source in southern Utah.

Warehouse . . .

Warehouse Prices, Page 174

Tonnagewise, July will probably be the low month of the year for the warehouse steel distributors because of widespread suspension of manufacturing operations for vacations throughout the country.

General action has not yet been taken by the trade on price revisions to reflect the increase in mill prices. Distributors at only a few points had effected changes up to late last week. Indications are it will be another week before new schedules are posted generally.

Most of the distributors have taken advantage of the recent lull in consuming demand on the mills to balance their inventories. Except for plates and shapes, stocks now are in good shape. The situation in structurals is improving, but plate supply continues tight.

Jobbers in the St. Louis area report that their sales are in a seasonal slump, but they view the outlook for coming weeks with considerable optimism. The situation elsewhere is pretty much the same. The increase in steel mill prices has had no effect on demand.

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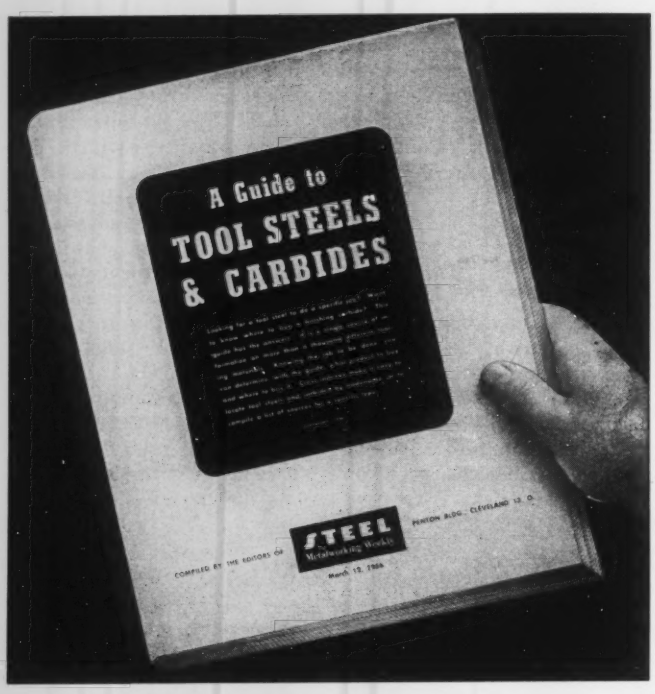

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Looking for a tool steel to do a specific job? Want to know where to buy a finishing carbide? This guide has the answers. It is a single source of information on more than a thousand different tooling materials. Knowing the job to be done, you can determine, with the guide, what product to buy and where to buy it. Cross indexes make it easy to locate tool steels and carbides by tradename, or to compile a list of sources for a single type.

40 PAGES

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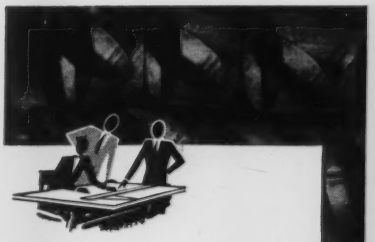

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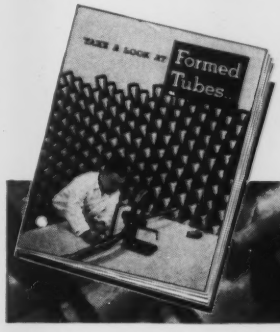

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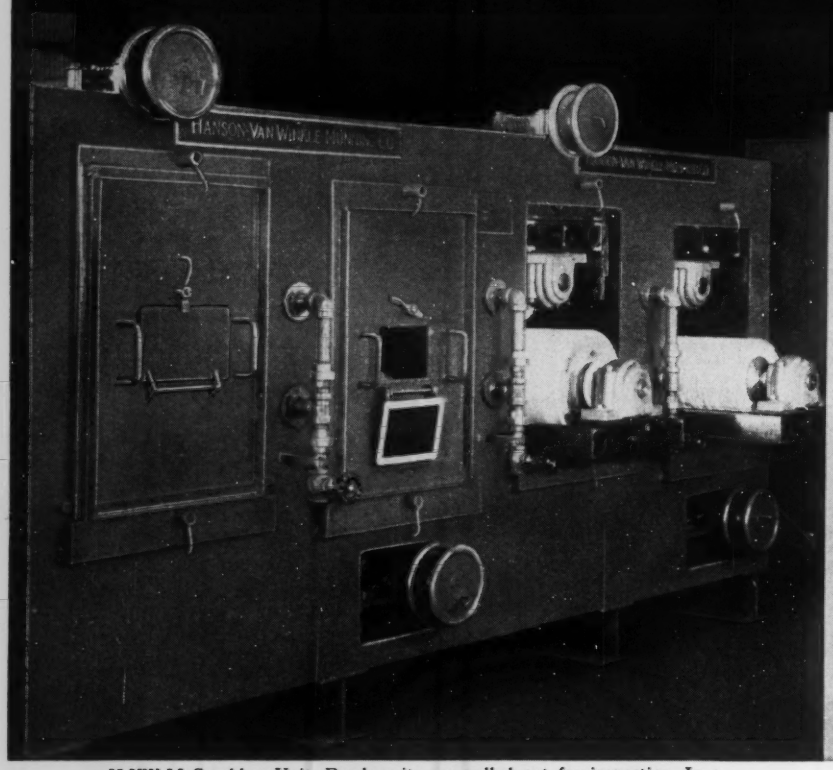

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